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Leadership Vacillation as a Pattern of CEO Succession: Existence, Antecedents, Boundary Conditions, and Performance Implications

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Leadership Vacillation as a Pattern of CEO Succession:
Existence, Antecedents, Boundary Conditions, and Performance Implications

by

Chieh-Chung James Yen

A dissertation presented to the
Graduate School of Arts and Sciences
of Washington University in
partial fulfillment of the
requirements for the degree
of Doctor of Philosophy

May 2014

St. Louis, Missouri

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the torpedo, was *within* the torpedo's safety distance so that it had not ignited yet. While I am not Jack Ryan, Jackson is definitely my Sean Connery/Captain Ramius. I will remember what he taught me and try to overcome my fear to difficult problems in research and in life.

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*I dedicate the dissertation to my wife, Shan-Hua Helen Tsai,
without whose love and support I could not have set out on this journey*

Abstract of the Dissertation

Leadership Vacillation as a Pattern of CEO Succession:

Existence, Antecedents, Boundary Conditions, and Performance Implications

by

Chieh-Chung James Yen

Doctor of Philosophy in Business Administration

Washington University in St. Louis, 2014

Professor Jackson Nickerson, Chair

CEO succession is a vital organizational decision because organizational strategy is a reflection of the experiences of a firm's top leader. The dissertation studies CEO succession by exploring its pattern, which reveals a dynamic nature of many succession decisions. One specific succession pattern, *leadership vacillation*, is observed in a grounded case of PepsiCo. Leadership vacillation occurs when organizations sequentially select their CEOs between "output" and "throughput" functions. To explain the existence of leadership vacillation, the study combines organizational vacillation theory (Nickerson and Zenger, 2002) with insights from upper echelons research (Hambrick and Mason, 1984) and studies on expert performance (Bereiter and Scardamalia, 1993). The study argues that some organizations dynamically balance exploration and exploitation by switching leaders between output and throughput functions, thus exhibiting the phenomenon of leadership vacillation. An empirical examination of 200 large, public companies indicates that the phenomenon is common and non-random. In addition, a probit model accounting for sample selection and a modified treatment effect model are employed to

correct for two endogeneity problems when assessing antecedents, boundary conditions, and performance implications of leadership vacillation. The empirical analyses provide initial evidence that leadership vacillation is a product of a series of *endogenous* successor choices, meaning that a departing leader's functional background has an impact on that of a successor. Knowledge of the phenomenon of leadership vacillation, which has not been explored in previous research, contributes to CEO succession studies in specific and to organization and strategy research in general. Finally, the dissertation discusses its limitations and suggests possible future research on leadership vacillation.

The true line is not between “hard” natural science and “soft” social sciences, but between precise science limited to highly abstract and simple phenomena in the laboratory and inexact science and technology dealing with complex problems in the real world.

—Herbert Simon, *Models of My Life* (1991: 302)

Chapter I: Introduction:

Leadership Vacillation as A Pattern of CEO Succession

Problem Statement

CEO succession is a vital organizational decision because organizational strategy—defining what a firm will and will not do—is a product of a firm’s top leader (Finkelstein, Hambrick, and Cannella, 2009). Researchers studying CEO succession argue that “in most succession events, new leaders are chosen because their experiences and credentials align with the strategic mandate” (Finkelstein, et al., 2009: 201). Empirical studies provide evidence supporting the argument.¹ For example, an increasing proportion of CEOs with finance backgrounds was selected after the U.S. government announced antitrust laws that encouraged corporate diversification, which entailed more finance-related problems and favored a leader’s financial, rather than marketing, skills (Fligstein, 1987; 1990; Ocasio and Kim, 1999). Leaders with the experience of *throughput* functions, which “work at improving the efficiency of the transformation process,” are positively associated with performance in organizations employing strategies that emphasize current profits; CEOs with the experience of *output* functions, which “are responsible for monitoring and adjusting products and markets,” are positively related to profitability in organizations pursuing strategies that focus on future growth (Hambrick and Mason, 1984: 199; see also Thomas, Litschert, and Ramaswamy, 1991).

These studies suggest that leaders can be classified into different types by their functional origins or backgrounds. Also, the empirical studies find first that a one-to-one correspondence—or fit—exists between each type of leader and strategy and next that this fit creates performance

¹ A caveat is that these findings may suffer from some endogeneity problems, which the study takes into account in the empirical analyses.

advantages (Gupta, 1984; Chaganti and Sambharya, 1987; Govindarajan, 1989; Guthrie and Olian, 1991; Guthrie and Datta, 1997; Barker and Mueller, 2002).

Yet research on organizational adaptation contends that organizations desiring high levels of long-run performance must employ two types of strategy: one supports *exploration* activity that develops future growth, and the other promotes *exploitation* activity that harvests current profits (March, 1991; Levinthal and March, 1993; Benner and Tushman, 2003). Except for those organizations whose goals are not long-run survival and growth, most adopt both exploration-related and exploitation-related strategies to seek high levels of future growth and current profits. Combining the two streams of research produces a conundrum: How do organizations select leaders to “balance” exploration and exploitation given that a one-to-one correspondence exists between leadership and strategy?

An emerging theory of “organizational vacillation” offers a possible approach by proposing a dynamic balance between exploration and exploitation (Nickerson and Zenger, 2002; Siggelkow and Levinthal, 2003; Gulati and Puranam, 2009; Stevens, Pil, and Holweg, 2012). Dynamic balance is accomplished by “temporally and sequentially alternating between [governance modes] that promote either exploration or exploitation” because governance modes are “discrete” in their functionality (Williamson, 1991; Boumgarden, Nickerson, and Zenger, 2012: 588). Research on organizational vacillation argues and finds initial evidence that some organizations attain high levels of exploration and exploitation through a vacillating pattern in choices of organizational structure (e.g., centralization vs. decentralization) and buyer-supplier relation (e.g., market vs. relational governance) (Nickerson and Zenger, 2002; Stevens, et al., 2012; Boumgarden, et al., 2012).

Like formal structure and governance mode, leader type also is discrete to the extent that

organizations adopting exploration strategies perform better when having *output CEOs*—leaders with output experience—and those employing exploitation strategies enjoy performance benefits when having *throughput CEOs*—leaders with throughput experience (Gupta and Govindarajan, 1984; Datta and Guthrie, 1994; Beal and Yasai-Ardekani, 2000; Barker and Mueller, 2002; Strandholm, Kumar, and Subramanian, 2004). That is, leader type is discrete when the fit between leadership and strategy exists and creates performance benefits.² Because each type of leader is capable of promoting either exploration or exploitation, the logic of dynamic balance proposed by the organizational vacillation theory also may be relevant to CEO successor choice. The resulting questions are: *Does such a vacillating pattern observed in structural and governance choices also appear in CEO succession? If so, what are the antecedents, boundary conditions, and performance consequences of the vacillating succession pattern?*

Study Outline

To motivate consideration of the possibility of a vacillating pattern in CEO succession, the study documents a series of CEO succession events in an archetypical, high-growth firm—PepsiCo. PepsiCo was chosen because it is a well-known, public company that has a long history of growth. Being a high-growth firm for a long period of time suggests that PepsiCo has maintained high levels of both exploration and exploitation activities, which require the adoptions of the two corresponding strategies. Therefore, PepsiCo provides an organizational context that is highly likely to observe, if any, a vacillating pattern in CEO succession. In addition, an interview with an ex-PepsiCo executive indicates that a vacillating pattern of CEO succession may be present in the company, suggesting that PepsiCo’s history is useful for exploring such a phenomenon.

With PepsiCo’s long history as one of the largest public companies in the United States,

² The study focuses on CEO functional origins and is agnostic about how various compositions of top management team affect leader-type discreteness.

the case not only offers an illustrating example of the vacillating succession pattern, but also encourages further analysis based on a sample of large, public companies to examine the generality of the phenomenon. Moreover, because PepsiCo is a public company, information about its leaders and CEO succession events is easily accessible and verified, providing enough data to evaluate plausible alternative explanations should any pattern is found in CEO succession. Finally, to provide a grounded illustration that informs theory development, the case focuses on documenting how PepsiCo CEOs' functional origins—a proxy of their experiences and credentials—were aligned with the strategic mandates the CEOs received when assuming the office. The PepsiCo case shows that an output leader was followed by a throughput CEO, and vice versa. A review of the five consecutive PepsiCo leaders exhibits a vacillating succession pattern between output and throughput CEOs. Such a vacillating pattern, hereinafter referred to as *leadership vacillation*, is defined as the times when organizations alternately select successive leaders from output and throughput functions.

To explain the existence of the phenomenon, I develop a theory of leadership vacillation by joining the organizational vacillation theory with insights from research on upper echelons and expert performance. The theory argues that an output CEO employs exploration strategies, which over time increase the levels of exploration activities more than those of exploitation activities; the process reverses when a throughput CEO adopts exploitation strategies. Because “the marginal increase in performance benefits from increased exploration as well as from exploitation are positive but with diminishing returns to scale” (Boumgarden, et al., 2012: 592), a switching point appears when continuing a type of strategy produces less value than shifting to the other. Consequently, organizations are likely to face ever-shifting strategic challenges between exploration and exploitation—challenges that shape the nature of CEO successors’

going-in mandates for those organizations seeking high-levels of long-run performance (March, 1991; Boumgarden, et al., 2012). To manage the shifting nature of strategic challenges and mandates, organizations select new leaders whose functional expertise aligns with either exploration or exploitation, assuming that high adjustment costs would occur if the leaders adopt strategies with different nature from that of the going-in mandates. Leadership vacillation thus reflects a series of a firm's deliberate choices of fitting leaders with strategies to attain high levels of both exploration and exploitation activities, which lead to high levels of long-run performance (Nickerson and Zenger, 2002; Boumgarden, et al., 2012).

To further assess the phenomenon's existence, antecedents, boundary conditions, and performance implications, the dissertation collects and analyzes a panel dataset of 569 CEOs in 200 large, public U.S. companies. Empirical analyses of the data indicate that leadership vacillation is a non-random and common phenomenon. A bivariate probit model accounting for sample selection is adopted to examine antecedents and boundary conditions determining the likelihood of changes in leader type (between two successive CEOs). Moreover, a modified treatment effect model is employed to evaluate the performance consequences of leadership vacillation by correcting for both sample selection and self selection problems. The findings of the empirical analyses suggest that the vacillating pattern reflects a firm's deliberate successor choices to gain performance advantages.

The dissertation defines, identifies, illustrates, and empirically examines the phenomenon of leadership vacillation. By applying the approach of organizational vacillation in the decision context of CEO succession, the dissertation (1) explains why leadership vacillation appears, (2) explores which antecedents lead to its emergence, (3) examines under which conditions it is likely (or less likely) to occur, and (4) estimates how much it affects a firm's performance

growth. To anticipate the answers to these four questions, I briefly report the findings of the dissertation. First, leadership vacillation occurs because some organizations switch their leaders and leader types to sequentially achieve higher levels of exploration and exploitation. Second, a departing CEO's tenure and a firm's pre-succession performance are two antecedent variables affecting likelihood of leadership vacillation. Third, two boundary conditions constrain the likelihood leadership vacillation: a board's *capacity* and its *motivation* to change leader types. Finally, after correcting for the two endogeneity problems, leadership vacillation³ increases a firm's returns on assets by 3.3% a year after the succession.

With the initial findings of leadership vacillation, the dissertation suggests that the organizational vacillation approach may be general and useful to assess other vital organizational decisions, in addition to the ones that have already been examined (e.g., organizational structures, governance modes, and alliances). The study also suggests, and provides preliminary evidence, that leadership vacillation is at least partially determined by endogenous components, instead of being merely triggered by external environmental shifts.

Several critical questions remain unanswered by the dissertation. For instance, do organizations specializing in either exploration or exploitation strategies still exhibit leadership vacillation, or do they hire only output or throughput CEOs, respectively? Do organizations whose aspirations are to be acquired (instead of long-run survival) or are to serve a niche market (instead of long-run growth) also alternate their successor choices between output and throughput functions? Future research on leadership vacillation can explore these questions.

In Chapter II, the dissertation chronicles PepsiCo's CEO successions to illustrate the phenomenon of leadership vacillation. Chapter III reviews relevant research on upper echelons,

³ The dissertation, in fact, examines the performance impact of changes in leader type between *two* successive CEOs. The empirical choice of the operational measure of leadership vacillation is discussed in Chapter IV.

organizational vacillation, and expert performance, and makes three corresponding assumptions. Chapter IV then develops a theory of leadership vacillation based on the three assumptions. In Chapters V, VI, and VII, I empirically examine the phenomenon's existence, antecedents and boundary conditions, as well as performance implications, respectively. Finally, the last chapter discusses limitations and possible future research before reaching the conclusion.

Chapter II: The Phenomenon of Leadership Vacillation: A Case Study of the Pattern of CEO Succession in PepsiCo Inc.

Introduction

To motivate consideration of the possibility of leadership vacillation, the study presents PepsiCo's history of CEO successions as an illustration of the phenomenon. This grounded case study facilitates both the theoretical development and the empirical analysis of leadership vacillation. First, the PepsiCo case highlights a dynamic, endogenous change in the nature of strategic mandates: Implementing an exploration strategy would eventually lead to a firm's motivation to switch to an exploitation strategy, and vice versa, because of the necessity and complementarity of the two strategies in promoting long-run performance (March, 1991). Moreover, the case focuses on the alignment between a new CEO's strategic mandate and his or her experience and credentials. Combining the two notions—the endogenous change in strategic mandates and the alignment between strategic mandate and CEO functional background—provides a theoretical foundation for leadership vacillation: Because the nature of an organization's strategic mandates alternates endogenously between exploration and exploitation, the notion of alignment implies that successor choices would change accordingly between output and throughput CEOs. Second, the PepsiCo case enriches knowledge of identification and measurement of leadership vacillation by documenting PepsiCo CEOs' functional origins—a proxy of their experiences and credentials—and their corresponding mandates and strategic moves—an indicator of the strategies they adopted. These measures provide the foundation for the following empirical analysis based on a large sample of firms.

The case study emphasizes the change in the nature of strategic mandates before and after the four CEO succession events by describing the relationship between the departing CEO and

the strategic challenges PepsiCo faced before a succession event as well as the fit between the successor CEO and the strategic solutions adopted immediately after the succession. Moreover, the chapter points out a close link between a leader's functional origin and his or her tendency in adopting a particular type of strategy: exploration or exploitation. The finding suggests that further examination and then generalization of CEO functional backgrounds is necessary for research on leadership vacillation, which requires both the identification and measurement of two different "types" of leaders.

The rationale for regarding the type of predecessor CEO as an antecedent of successor choice is that CEO succession may be path dependent. According to research on upper echelon, "organizational outcomes . . . are viewed as reflections of the values and cognitive bases of the [leader] in the organization" (Hambrick and Mason, 1984: 193). Accordingly, CEO succession is path dependent when the criteria for selecting a new leader reflect organizational outcomes shaped by "the values and cognitive bases" of a predecessor. That said, path dependence of CEO succession only implies that some patterns of CEO succession may exist but whether the pattern is a vacillating one requires observation and further examination.

Helmich (1974), for example, provided insight about path dependence by examining a pattern of *pure inside succession*, in which two consecutive CEOs are both insiders. The two types of CEOs in his study are therefore insider and outsider. Helmich (1974) also reported that firms having the pattern of pure inside succession were associated with lower rates of growth than those in firms exhibiting other patterns involving outsiders.⁴ Although Helmich (1974)

⁴ Pure inside succession is the pattern of *insider-insider*. Other patterns include outsider-outsider, outsider-insider, and insider-outsider. In addition, Helmich (1974) used four measures of organizational growth, only two of which were found to relate significantly to patterns of CEO succession: membership size of the board of directors and number of subsidiaries that are 50 percent or more owned (Helmich, 1974: 774). Note that the measure of sales volume is not significant.

provided initial evidence supporting that pure inside succession has performance implications on a firm's growth rate, his sample was of insufficient size to conclude statistically that the pattern studied is non-random. Moreover, no further research was conducted to explain why the pattern of pure inside succession would exist in the first place.

Building upon Helmich's (1974) exploratory work on the path dependence of CEO succession, the dissertation continues the previous work by providing both the theory and the empirics needed to demonstrate the existence of a CEO succession pattern: leadership vacillation. Chapter II provides an illustration of PepsiCo's forty-year history that exhibited a vacillating pattern among five consecutive CEOs. PepsiCo's case shed lights on two theoretical elements in explaining the phenomenon of leadership vacillation: (1) the endogenous change in the firm's strategic mandates and (2) the board's attempt to match a successor's leader type with the imperative challenges the firm faced around the time of a succession because each type of leader is capable of solving either exploration or exploitation-related problems. The two elements provides the foundation for further theoretical development and empirical examination of leadership vacillation, which will be discussed in later chapters. In summary, the PepsiCo case shows that an output CEO was followed by a throughput CEO, and vice versa, and that a vacillating succession pattern appeared among the five PepsiCo leaders.

PepsiCo's CEO Successions

A Growth Company: PepsiCo from 1965 to 2011

The study of path dependence of CEO succession demands a research setting where the focal organization examined has multiple succession events. PepsiCo is chosen because of three reasons. First, PepsiCo is a public company for over four decades, a time during which the company has had five CEOs and four succession events, allowing an exploration of path

dependence in CEO succession (Salamie, 2006).⁵ Moreover, because PepsiCo is a public company, information about its leaders and CEO succession events is easily accessible and verified, helping to make a strong case when a pattern is found in CEO succession. Second, PepsiCo has shown a history of high growth, which suggests that the company has achieved and maintained, in a long period of time, high levels of both exploration and exploitation activities that required the adoptions of the two corresponding strategies.⁶ PepsiCo thus provides an organizational setting that is likely to observe, if any, a vacillating pattern in CEO succession that is due to the adoptions of exploration and exploitation strategies. Finally, an interview with an ex-PepsiCo executive suggests that a vacillating pattern may be present and that PepsiCo's history of CEO succession may be useful for understanding such a phenomenon.⁷ Employing PepsiCo as an illustrating case study also encourages further analysis based on a sample of other large, public companies to examine the generality of leadership vacillation.

The analysis of PepsiCo is based on a variety of data sources, including PepsiCo's annual reports, international directory of company histories (e.g., Gasbarre, 2000; Salamie, 2006), news articles about its five CEOs identified through Lexis-Nexis, Roger Enrico's book *The Other Guy Blinked*, an interview transcript with an ex-PepsiCo executive, case studies about PepsiCo's major strategic and structural changes (Pearson, Boneysteele, and Nurme, 1989; Porter, 1994; Garvin and Sull, 1996; Venkataraman, 2002; Thomas, Carrioglia, and Kanji, 2003), and securities analyst reports (Credit Suisse, Deutsche Bank, First Boston Corporation, PaineWebber, Prudential and Smith Barney) about PepsiCo's major decisions and activities immediately after

⁵ Note that the study focuses on the company after the 1965 merger of Pepsi-Cola and Frito-Lay. Pepsi-Cola, the original beverage company, had a long history well before 1965.

⁶ The implication is derived from March's (1991) argument that balancing high levels of both exploration and exploitation is necessary for a firm's long-run survival and growth.

⁷ The interview was conducted by Professor Jackson Nickerson in December 2010. Professor Nickerson provided the transcript of the interview.

each CEO succession. Using these data sources, I construct a focused history of PepsiCo's four CEO succession events and organize them into five sections demarcated by the appointments of the five CEOs.

The case study examines PepsiCo from 1965 to 2011—a time during which PepsiCo grew to become the world's second largest beverage company. In the beginning of 2011, PepsiCo marketed at least 365 products, compared to only eight in 1965; expanded its business to 82 more countries; and increased its revenues from 510 million to 60 billion. With its growing product lines and international operations, the number of PepsiCo's employees increased from 19,000 to 203,000.⁸ The company's substantial growth corresponded with its profitability. In particular, the company's annual earnings rose from 60 million to eight billion, return on invested capital climbed from 13 to 24 percent, and the stock price increased 80 times.⁹ While drifting up and down during the years, PepsiCo's stock price significantly outperformed market indices, such as the S&P 500 and S&P beverage and food industry (Figure 1). During the time period, PepsiCo emerged as the world's second largest beverage company and the world's largest beverages and snacks company if the sales of Frito-Lay were included. These figures are remarkable especially when one considers the intense competition in the carbonated soft-drink industry between PepsiCo and its archrival, The Coca-Cola Company (e.g., Porter, 1994). In summary, PepsiCo's financial performance provides evidence of its long-run survival and growth.

⁸ PepsiCo's employees first topped 400,000 in 1996 and then dropped in 1997 when the firm spun off its restaurant businesses, including KFC, Pizza Hut, and Taco Bell. The number of employees consistently increases ever since.

⁹ The figures include the revenues of PepsiCo's two bottlers after the merger at 2010. Before the mergers, PepsiCo's revenues were 43 billion at the end of 2009. Data of PepsiCo stock prices are retrieved from CRSP.

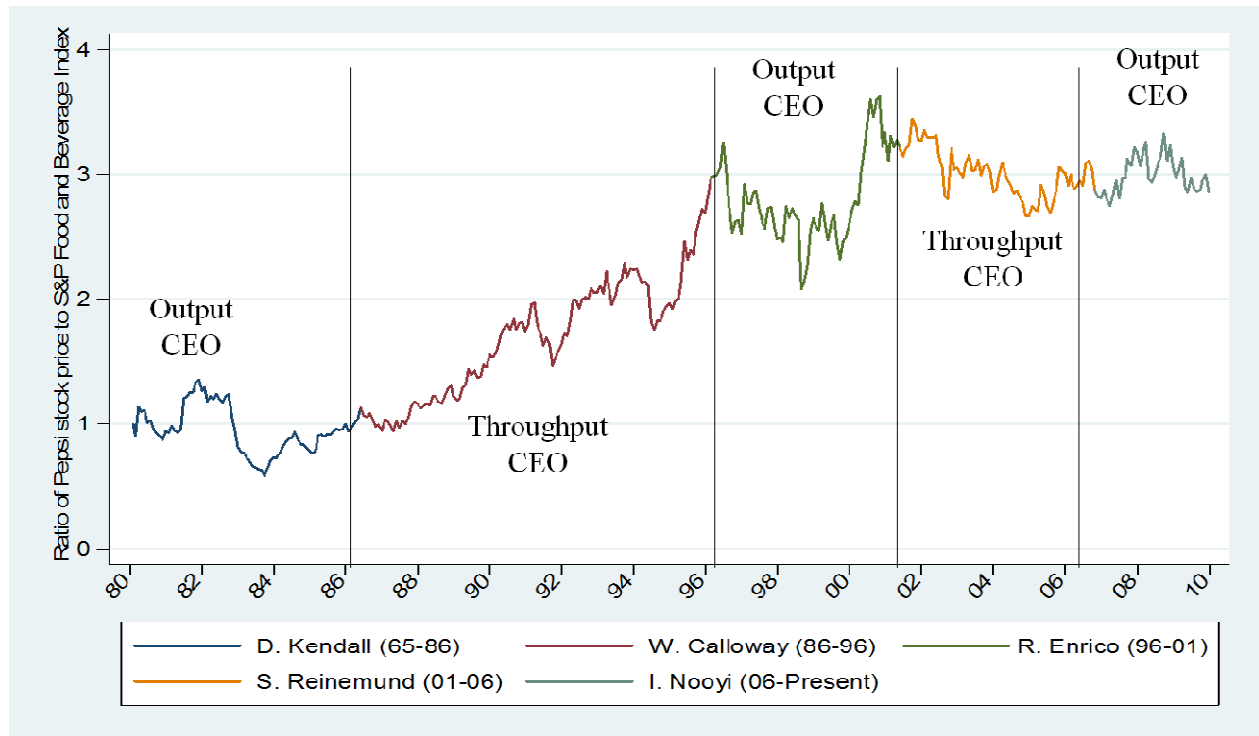


Figure 1. Ratio of PepsiCo's Stock Price to S&P Beverage and Food Industry (1980-2010), where the Ratio is above 1, PepsiCo Outperformed the Industry. *PepsiCo's Stock Price is Adjusted by Stock Split.

Donald Kendall: An Output CEO (1965-1986)

In 1965, with the intent of creating an international company diversified in consumer beverages and foods, PepsiCo was founded by the merger of Pepsi-Cola and Frito-Lay (Salamie, 2006). Initially, PepsiCo adopted a product-based structure in which beverage and snack food divisions operated largely independently. The first CEO, Donald Kendall, received a strategic mandate: Sell the products of Frito-Lay to international markets and bundle the sales of beverage and snacks (Gasbarre, 2000). To achieve the mandate, Kendall created an international division capitalizing on Pepsi-Cola's 108 overseas operations to promote the sales of Frito-Lay (Gasbarre, 2000). The structural change followed the new strategy of diversification to fulfill Kendall's strategic mandate.

Kendall joined Pepsi-Cola Company as a sales representative, rose through the sales ranks, and in 1956 became a marketing vice president. His functional origin—sales and marketing—is one of the output functions identified by Hambrick and Mason (1984). In 1957 he was head of Pepsi-Cola’s international operation and in 1963 became the company’s president. Kendall designed the merger of Pepsi-Cola and Frito-Lay by successfully persuading Herman Lay—then the President of Frito-Lay—to embrace the vision of a combined beverage and snack food company, which creates the foundation of today’s PepsiCo Inc. (Salamie, 2006).¹⁰ Donald Kendall was seen as “the visionary, the one who makes all these big bold moves, a pretty charismatic leader,...[and] a figure on the global stage.”¹¹

Moreover, Kendall’s strategic mandate and, in fact, his strategic orientation during the entire tenure was toward market expansion, diversification, and marketing activities in both domestic and international markets (Muris, Scheffman, and Spiller, 1992). For example, he had made PepsiCo products available in China and Khrushchev’s Soviet Union; he diversified into truck leasing, transportation, and sporting goods businesses; he also introduced new soft drinks, massive advertising campaigns, and packaging innovations into the soft drink industry (Gasbarre, 2000).¹² In addition, PepsiCo also outsourced the activities of manufacturing and distribution to bottling franchisees for the purpose of expanding domestic beverage market shares because the company lacked financial resources to vertically integrate the bottlers (Muris, Scheffman, and Spiller, 1993). Kendall’s strategic moves supported exploration activities and brought about PepsiCo’s rapid growth in both geographic and product markets. However, by the early 1980’s,

¹⁰ A quote from Donald Kendall—then the head of Pepsi-Cola—can best describe the strategic rationale of the merger: “You (i.e., Frito-Lay) make [customers] thirsty and I (i.e., Pepsi-Cola) will give them something to drink” (Salamie, 2006: 340).

¹¹ Direct quote from the interview.

¹² In the late 1970’s, Kendall acquired two fast-food restaurant chains, Taco Bell and Pizza Hut, and used them as new outlets for Pepsi products. Kendall also diversified outside the beverage and food industry, purchasing North American Van Lines, Lee Way Motor Freight, and Wilson Sporting Goods.

the increasing size and complexity of PepsiCo's operation led to increased costs and operational inefficiency, which became the company's most imperative challenge before the eve of Kendall's retirement (*PepsiCo Annual Report*, 1985).

Wayne Calloway: A Throughput CEO (1986-1996)

So in 1986, Wayne Calloway—a throughput CEO from accounting and finance—succeeded Kendall with the strategic mandate of “withdrawing from the transportation and sporting goods businesses . . . and focusing its resources on soft drinks, snack foods, and restaurants” (*PepsiCo Annual Report*, 1986: 3). Moreover, PepsiCo “decided to sell [its] foreign bottling operations to local business leaders” because the operations are not cost effective (*PepsiCo Annual Report*, 1986: 3). To achieve the strategic mandates that emphasize exploitation rather than exploration, Calloway reorganized the corporation as a purely product-based structure: Beverage operations were combined under PepsiCo Worldwide Beverages, snack food operations under PepsiCo Worldwide Foods, and restaurant businesses under PepsiCo Worldwide Restaurant. Three years later, in 1989, PepsiCo restructured again and then organized by both product line and geography. To increase the efficiency of decision making and communication, the layer of the worldwide divisions was removed, and the heads of the new business divisions reported directly to Calloway.

In the 1980's, PepsiCo vertically integrated the bottlers; by the beginning of the 1990's, it owned most of the bottling operations. The acquisition of the bottlers resulted in cost effectiveness (Muris, et al., 1993). For example, Muris, et al. (1993) estimated the change in unit sales of a large bottler, called MEI, after it was acquired by PepsiCo. Analyzing the impact of the acquisition on the cost efficiency of MEI, Muris, et al. (1993) concluded that the acquisition brought about significant cost reductions and increases in efficiency (Muris, et al., 1993). Both

the formal structure and governance mode changed in accordance with the strategic mandate to consolidate unprofitable businesses and to increase the operating efficiency of the remaining ones.

Calloway attended Wake Forest University and earned an accounting degree. During his 29 years at PepsiCo, he was President and CEO of Frito-Lay, Executive Vice President and Chief Financial Officer (CFO) of PepsiCo, and President and CEO of the company. Calloway's functional background—finance and accounting—is one of the throughput functions (Hambrick and Mason, 1984). He also “earned a reputation as a sharp financial thinker and popular manager” (*Business Week*, 1992). According to one executive in PepsiCo, Calloway was “an accountant, a finance guy. He works on all the nuts and bolts . . . but there is none of these big dramatic booms,” and his strategic orientation was to “tighten up the operations,” which emphasized exploitation more than exploration.¹³ Under Calloway's leadership, PepsiCo divested non-core businesses, streamlined its operations, and posted “phenomenal growth figures: . . . its revenues increased from eight billion to 32 billion, and its market capitalization grew from seven billion to 46 billion dollars” (Mayo and Nohria, 2005: 308). Unfortunately, these actions emphasizing efficiency of internal operations ultimately resulted in a lack of resources devoting to the marketing activities in its core beverage business (Salamie, 2006). As a result, toward the end of the Calloway's reign, PepsiCo encountered a strategic challenge that requires the firm's attention to the external markets rather than its internal operations. Put differently, PepsiCo faced a strategic challenge of exploration that was due to the firm's consistent and effective pursuit of exploitation during Calloway's tenure.

¹³ Quote from the interview.

Roger Enrico: An Output CEO (1996-2001)

In 1996, Roger Enrico—an output leader—became the CEO. Wayne Calloway, who was convinced that Enrico was the right choice, personally persuaded him to accept the offer. In Enrico's first letter to shareholders, he reported that while PepsiCo reached record sales of 32 billion dollars, its core business—the beverage segment—was doing poorly outside the United States, losing market share to its archrival, The Coca-Cola Company (*PepsiCo Annual Report*, 1996). His strategic mandate was to resolve the challenge of exploration and to expand the market share of PepsiCo's beverage operation. To do so, Enrico spun off PepsiCo's restaurants into Tricon Global Restaurants so that PepsiCo could concentrate on its beverage and snack food segments.¹⁴ He also spun off the capital-intensive bottling operation as Pepsi Bottling Group, allowing PepsiCo to devote more resources to marketing, rather than manufacturing (Moriguchi, 2000). In addition, to coordinate resource allocation within the beverage segment, the firm returned to a product-based structure by combining its domestic and international operations into one division for beverages (Pepsi-Cola Company) and another for snack foods (Frito-Lay Company). The formal structure of PepsiCo again followed its strategic emphasis on market expansion and product innovation.

Enrico began his PepsiCo career as an associate brand manager for an onion-flavored snack at the Frito-Lay division in Dallas (Enrico and Kornbluth, 1986). At 31 he was President of PepsiCo Foods Japan. Later he went back to the United States and joined the top management team as Pepsi-Cola's President. His primary accomplishments were several famous marketing campaigns, including the Pepsi Challenge—a blind taste test of Coca-Cola and Pepsi-Cola—and the Pepsi Generation—a series of advertising commercials starring Michael Jackson and his brothers. Enrico's functional background—marketing—is one of the output functions. He also

¹⁴ Tricon Global Restaurants is now Yum! Brands.

was described as the “charismatic marketing guru, and he wanted to make marketing king again.” During his tenure, “it was the time when all divisions had extravaganzas,” and he “wanted people to really feel empowered, to think big, and to do big things.”

During Enrico’s reign, he built sales in PepsiCo’s supermarket channels and launched an initiative called “Power of One” that aimed to take advantage of the synergies between Frito-Lay’s salty snacks and Pepsi-Cola’s beverages (*PepsiCo Annual Report*, 1997). He successfully persuaded the grocery retailers to place soft drinks next to Frito-Lay’s snacks by arguing that such a placement would increase supermarket sales because it is easier for customers to purchase them together (Salamie, 2006). Although the idea of “Power of One” was the rationale for the merger of Pepsi-Cola and Frito-Lay in the first place, it is Enrico’s marketing strategy that fully realized the synergies originally envisioned by Donald Kendall, bringing sales of both snacks and beverages to PepsiCo—while Coca-Cola could only benefit in the beverages (Salamie, 2006).

During his tenure, Enrico also acquired Tropicana—the world’s largest branded juice company in 1998—and Quaker Oats, which also owned Gatorade—the producer of the number one sports beverage. The two acquisitions were to expand the product lines of PepsiCo into juice, breakfast cereal, and sports beverage as well as to capitalize synergy of centralized distribution channels. Indeed, the merge with Quaker Oats, for example, later created mushrooming number of product lines that combine both PepsiCo’s and Quaker Oats’ product attributes. One interesting observation is that Enrico supervised and signed the merger agreement with Quaker Oats just before his retirement in December 2000. He must have anticipated that the post-merger integration required a successor adept at internal operation rather than external expansion. Consequently, the strategic challenge facing PepsiCo around Enrico’s retirement was exploitation that is due to the market exploration designed by the departing CEO.

Steven Reinemund: A Throughput CEO (2001-2006)

Steven Reinemund—a throughput CEO—took over the helm in 2001 as soon as the deal with Quaker Oats closed and received the strategic mandate of ensuring that the merger produced shareholder return (Halpern, 2005). To facilitate the post-merger integration, Reinemund restructured PepsiCo and formed PepsiCo Beverages and Foods North America to encompass both the products of Quaker Oats and those of PepsiCo.¹⁵ In addition, a new “Power of One” sales team was introduced to promote and sell the newly acquired Quaker and Tropicana together with PepsiCo’s existing products (Halpern, 2005). Reinemund’s initiative was aimed to integrate selling operations and distribution logistics because Pepsi, Tropicana, Frito-Lay, and Quaker previously ran separate distribution systems even though the four divisions delivered their products to the same U.S. stores. After the integration and reorganization, Reinemund made these divisions act as a single company (Salamie, 2005). In late 2003, Reinemund announced another reorganization plan that intended to reduce redundancies by terminating the employment of 750 people and closing a Frito-Lay factory. All of the strategic and structural moves Reinemund made in the first two years of his tenure were exploitation-oriented, which focused on cost reduction instead of revenue expansion (Halpern, 2005).

Reinemund joined PepsiCo as a manager at Pizza Hut, one of PepsiCo’s restaurant businesses, “where you count every penny, you count every person, you count every action, [and] that was Steve Reinemund’s approach.”¹⁶ His functional origin—restaurant operation—is one of the throughput functions (Hambrick and Mason, 1984). During his way up to the corporate ladder, Reinemund earned a reputation as a “visionary who knew how to translate the big picture into clearly defined goals” (USA Today, December 5, 2000). For example, when Eagle Snacks

¹⁵ The other two divisions were Frito-Lay North America and PepsiCo International.

¹⁶ Quote from the interview.

challenged Frito-Lay's sales, Reinemund overhauled logistics to make it easier for route managers to forecast and fill inventories (USA Today, December 5, 2000). He was described as "the most disciplined man [who] brought that same sense of discipline to everything he did in the business world as well."¹⁷

Reinemund's overall strategic orientation was toward efficiency and internal operation. However, in 2004, Reinemund, to respond to the increasing health concerns of consumers, envisioned that PepsiCo's products should reflect "a diet based on moderation and balance" in addition to the company's hallmark products of chips and soda (*PepsiCo Annual Report*, 2004). To achieve the new strategic mandate, he formulated a growth strategy focusing on developing "Good-for-you" products. Once again, the company was reorganized and divided by three product categories: "Good-for-you" products, such as Quaker products and Tropicana orange juice; "Fun-for-you" products, such as Doritos and Pepsi-Cola; and "Better-for-you" products, brands like Baked Lays that have fewer calories and less fat. However, the growth strategy defined a new strategic mandate that requires efforts and expertise of an output leader, which were delivered by the successor CEO Indra Nooyi.

Indra Nooyi: An Output CEO (2006-Present)

In early 2006, PepsiCo was planning a fourth CEO succession since the founding of the company in 1965. Two successor candidates, with quite different backgrounds, competed for the leader position of PepsiCo. According to an ex-PepsiCo executive, "the story that goes in the halls of 4-3, which is Building Number 4, Floor 3—the executive level—is that they each had their day with the board." One candidate was Michael White, who "is more of an operator," he is "the one behind successful operations" of many business units. The other was Indra Nooyi, who "is more

¹⁷ Quote from the interview.

of a big picture person.”¹⁸ Nooyi—an output leader who started her career in India as a product manager for Johnson & Johnson—was finally chosen to take charge of the company in late 2006.

Ever since CEO Nooyi assumed the office, she has taken steps toward making PepsiCo more health-conscious because her strategic mandate was to cope with the challenge of changing consumer behavior and to implement the growth strategy envisioned by her predecessor CEO Reinemund (PepsiCo annual report, 2007). The first thing she did when she assumed the office was to create a new top executive position, Chief Scientific Officer (CSO), and recruit Dr. Mehmood Khan as PepsiCo’s first CSO from the top R&D job at a pharmaceutical company, Takeda Pharmaceuticals. In November 2007, PepsiCo restructured its global operations into three divisions because the company “is approaching a size which we can better manage as three units instead of two,” said CEO Nooyi in the company’s 2008 8-K report.¹⁹ The rationale for the restructuring was to realize each sector’s scale and growth potential and to provide more executives the opportunity to run large operating businesses (PepsiCo 8-K report, 2008).

After her job as a product manager in India’s Johnson & Johnson, Nooyi spent six years at The Boston Consulting Group as an international corporate strategy director. She also worked for Motorola’s automotive and industrial electronic group, and later became senior vice president of strategy and strategic marketing for a Swiss power and automation technologies company. In 1994, Nooyi joined PepsiCo as senior vice president of corporate strategy and development, and later she became president and CFO before her appointment as CEO. Her primary functional origin—strategic planning—is one of the output functions because strategic planning, while not

¹⁸ Quote from the interview.

¹⁹ 8-K report is a very broad form used to notify investors of any material event that is important to shareholders, such as the departure of a CEO or, in this case, the change in organizational structure. The three divisions are (1) PepsiCo Americas Foods (PAF), which includes Frito-Lay North America, Quaker Foods North America and all of the Latin American food and snack businesses; (2) PepsiCo Americas Beverages (PAB) which includes PepsiCo Beverages North America and all of the Latin American beverage businesses; and (3) PepsiCo International (PI), which includes all PepsiCo businesses in the United Kingdom, Europe, Asia, Middle East and Africa.

included in Hambrick and Mason's (1984) original examples of output functions, has more to do with "monitoring and adjusting products and markets" than with "the efficiency of the transformation process" (Hambrick and Mason, 1984: 199). The expertise and functional background of strategic planning and marketing equipped Nooyi to fulfill the strategic mandate of redefining PepsiCo as a healthy beverage and food company.

Nooyi, however, has faced increasing criticism in early 2012 as PepsiCo's stock price has stagnated relative to Coca-Cola's and its beverage sales has struggled. To respond to the criticism, Nooyi announced a big boost in marketing spending to revive PepsiCo's U.S. beverage business and to globalize its advertising campaigns. In February 2012, however, PepsiCo made changes in several of its top management positions, signaling that it is accelerating plans to prepare a successor for CEO Indra Nooyi (Rappeport, 2012). Who—what type of leader—will be selected as the next PepsiCo CEO? Several news articles made their conjectures, pointing out three to four potential candidates for the leader position, including both output-oriented and throughput-oriented leaders. However, until late 2013, Nooyi is still chairperson and CEO of the company. It will be interesting to see who becomes the next leader and whether or not PepsiCo alternates its successor type once again.

Assessment: A Vacillating CEO Succession Pattern

During the 45-year time period examined, PepsiCo had four CEO successions with five leaders. The case analysis assesses whether PepsiCo's CEO succession is path dependent and, if so, what kind of pattern there is among the types of consecutive CEOs. The assessment is based on information about the functional origins of the five CEOs, their strategic mandates, the strategic and structural moves they make to accomplish the mandates, the organizational challenges resulting from those moves, and the new strategic mandates shaped by these challenges.

The functional origins of these leaders are *sales*, *accounting*, *marketing*, *restaurant operations*, and *strategic planning*, respectively. Based on the definitions of output and throughput functions used in upper echelons research (Hambrick and Mason, 1984; Thomas, et al., 1991; Finkelstein, et al., 2009), the five leaders can be classified into two types: The first, third, and fifth leaders are output CEOs (*O*), while the second and fourth are throughput ones (*T*). PepsiCo's successor choices alternated between output and throughput leaders and exhibited a vacillating pattern of *O-T-O-T-O*. In addition, the strategic mandates the five CEOs received are *expanding markets*, *streamlining organizations*, *increasing market shares* of the beverage business, *post-merger integration*, and *redefining PepsiCo* as a healthy beverage and food company, respectively. Along with leadership vacillation, these mandates also are vacillating if we categorize them into either exploration and market-oriented or exploitation and operation-oriented. Moreover, the case suggests that the CEOs were selected because their functional experiences and reputations matched the strategic mandates PepsiCo's board formulated and the organizational challenges they faced at the time of each CEO succession.

From the case study, it is apparent that organizational structure followed the firm's strategy, which was shaped or determined by the mandate successor CEOs received from the board of directors. The mandate, in turn, was framed and formulated by the firm's organizational challenges, challenges that are the by-products of strategic and structural moves designed and executed by the departing CEO. The first CEO, Kendall, received the mandate of entering international markets, a mandate that is due to the merger of Pepsi-Cola and Frito-Lay; the second CEO, Calloway, had the mandate of streamlining and divesting the businesses into which his predecessor diversified; the third CEO, Enrico, faced the mandate of reviving beverage sales, which required more resources devoted to marketing, instead of manufacturing and operation;

the fourth CEO, Reinemund, got the mandate of implementing a post-merger integration with Quaker Oats, a merger agreement designed by his predecessor; the current CEO, Nooyi, worked on the mandate of repositioning PepsiCo as a healthy beverage and food company, which was a growth strategy proposed by her predecessor.

From the above observations, I make two generalizations. First, the expansion of a company's operations to other geographic and product markets would increase its revenues in a period of time but ultimately increase the costs of operations due to conflicts and inconsistency among autonomous operating units. Thus streamlining was an organizational challenge that emerged after many years' successful market expansion and exploration strategy. Second, an emphasis on a firm's internal operations and efficiency would decrease its operating costs in a period of time but eventually decreased its revenues because of a lack of resources devoting to product innovation and market development. Accordingly, redirecting the firm's focus to customer and marketing activities was an organizational consequence that followed after successful reorganization efforts and exploitation strategy. The case analysis implies that market-oriented (or exploration) strategy and efficiency-oriented (or exploitation) strategy beget each other over time. The choice of CEO successor is therefore following a similar alternating pattern when the board of directors deliberately selected new leaders to fit the vacillating strategic challenges between exploration and exploitation.

By analyzing the case and its details, the chapter answers the two questions raised in the beginning of the assessment: Whether PepsiCo's CEO succession is path dependent, and if so, what kind of succession pattern it is. First, the case study indicates that PepsiCo's CEO succession is path dependent because a successor's going-in mandate—an essential criterion for selecting new CEO—is closely related to the challenges shaped by the strategic and structural

moves of the departing CEO. This inference is consistent with scholars and practitioners who regard the opportunity of CEO succession as an adaptation mechanism to undertake an organization's challenges (Pfeffer and Salancik, 1978: 225-256; Tushman and Romanelli, 1985; Wiersema and Bantel, 1993). However, the current study provides new insight to previous research because it suggests, and provides one piece of evidence, that the challenges that shape a successor's going-in mandate are outcomes of a predecessor's strategic moves, instead of merely changes in external environmental conditions.

The case study also finds that PepsiCo had a vacillating succession pattern, characterizing the functional origins of consecutive CEOs. Before grouping the disparate functions into two major types, I evaluate two predictions made by the upper echelon theory: Whether the two types of leaders received two kinds of strategic mandates, and whether the two types of leaders had two kinds of strategic moves, respectively (Hambrick and Mason, 1984). I found that the answers to both questions are positive, which align with the predictions of the upper echelon theory. Namely, output leaders received exploration-related mandates and adopted exploration-oriented strategies, while throughput CEOs were given exploitation-related mandates and employed exploitation-oriented strategies. The case analysis shows that the categorization of the two leader types are of theoretical foundation instead of mere induction or random choice of categories.

To sum up, the case study suggests that PepsiCo's five leaders are of two types: output CEOs and throughput CEOs. Equally important, the two types of leaders have substantive differences in terms of the strategic mandates they received and the strategic orientations they possessed (Hambrick and Mason, 1984; Tomas, et al., 1991). Combining the two observations, I identify and define an empirical pattern of leadership vacillation as the time when organizations

alternately select successive CEOs from output and throughput functions. My methodological approach to the case analysis is similar to the way in which cases are used in theory development (Yin, 2009). That is, a CEO succession pattern of leadership vacillation is identified and defined from the PepsiCo case, providing an organizational phenomenon for further theory development and empirical analysis.

The Phenomenon: *Leadership vacillation occurs when organizations alternately select successive CEOs from output and throughput functions.*

Chapter III: Literature Review:

Research on Upper Echelons, Organization Vacillation, and Expert Performance

Introduction

From the previous chapter I identified the organizational phenomenon of leadership vacillation and made some observations that help explain why the phenomenon would appear in PepsiCo. These observations, if can be generalized into corresponding assumptions, provide the building blocks for developing a theory of leadership vacillation. Chapter III thus offers literature review of three streams of research that supports the generalization of the three case observations into three theoretical assumptions, respectively. By joining the insights from the three research approaches, I combine the three assumptions to develop a theory of leadership vacillation, which will be elaborated in Chapter IV.

The three assumptions essential to the development of a theory of leadership vacillation are (A1) the *alignment* between a firm's strategic mandate and its successor's experiences and credentials, (A2) the *endogenous change* in the nature of strategic challenges—as well as going-in mandates—a firm faces over time, and (A3) the *high adjustment costs* of leaders in changing the nature of the strategic mandates. The first assumption is derived from upper echelons research (e.g., Hambrick and Mason, 1984), the second from organizational vacillation (e.g., Nickerson and Zenger, 2002), and the third from studies of expertise and expert performance (e.g., Bereiter and Scardamalia, 1993).

The three assumptions constitute and correspond to a board of directors, an organization, and a CEO, respectively. In particular, the assumption (A1) states that *a board of directors* selects a new leader because the leader's experiences and credentials fit a firm's strategic

challenges, which constitute the new leader's going-in mandate. The assumption (A2) argues that *an organization* alternates its strategic mandates between exploration and exploitation to achieve high levels of both activities if the organization wishes to obtain high levels of long-run performance, which constitute both long-run survival and growth.²⁰ Finally, the assumption (A3) implies that leader types are discrete because it is difficult for *a CEO* to be both an expert in exploration and that in exploitation. The three assumptions together form a dynamic system of leadership vacillation—a subject of Chapter IV.

To anticipate how the three assumptions can be used to develop the leadership vacillation theory, I briefly state the dynamic system. The theory argues that leadership vacillation is a by-product resulting from many organizations' desire to survive and grow because organizations, to seek high levels of long-run performance, switch their leaders between output and throughput functions so that they can dynamically enhance the levels of both exploration and exploitation activities. As long as organizations strive to survive and grow, the theory (Chapter IV) predicts that leadership vacillation is likely to emerge because the needs of strategy vacillation (A2) accompanying the high adjustment costs of CEOs in switching between the two strategies (A3) are likely to create a vacillating pattern of CEO succession when boards of directors align new leaders' experiences and credentials with the vacillating strategic mandates (A1). Chapter III is organized into three parts, each of which provides literature review that supports one of the assumptions.

²⁰ Theoretically, the definition of long-run performance encompasses both survival and growth (March, 1991). Therefore, both a firm that grows rapidly in a short period of time but does not survive in the long-run and a firm that survives but does not grow fail to achieve high levels of long-run performance.

Alignment Between Leadership and Strategy

Research on upper echelons proposes and finds both that a correspondence exists between a CEO's functional origin and a firm's strategy and that organizations matching leaders with strategies enjoy higher performance (Hambrick and Mason, 1984; Gupta and Govindarajan, 1984; Thomas, et al., 1991; Rajagopalan and Datta, 1996). Adopting Miles and Snow's (1978) typology, upper echelons scholars classify strategies into three kinds, which correspond to three types of firms: prospector, defender, and analyzer. The first concentrates on development of new products, the second focuses on market penetration of current products, and the third combines these two emphases (Miles and Snow, 1978). For instance, studying major tobacco companies, Chaganti and Sambharya (1987) found that the functional backgrounds of top executives at Philip Morris (a prospector company) were different from those at American Brands (a defender company) and those at R. J. Reynolds (an analyzer company). Specifically, the prospector had proportionately more executives with marketing and R&D backgrounds and fewer with finance backgrounds. In another study, Thomas, et al., (1991) found similar results when examining the functional backgrounds of computer company CEOs: 77 percent of leaders in the prospector companies had experience primarily in output functions, while only ten percent in the defender companies. Conversely, 90 percent in the defender companies were mainly from throughput functions, compared to 23 percent in the prospector companies (Thomas, et al., 1991).

Other studies, classifying strategies differently from Miles and Snow (1978), found similar associations between CEO functional origin and strategy. In a study of 187 hospitals, Strandholm, et al. (2004) found that top managers in firms adopting "market-oriented" strategies have more experience in output functions, while those in firms engaging in "efficiency-focused"

strategies have more experience in throughput functions.²¹ Barker and Mueller (2002) reported that CEO experience in output functions is positively related to R&D spending, and Tyler and Steensma (1998) found that executives with experiences primarily in R&D are more likely to favorably rate an opportunity of technology alliance than those with other functional experiences. Finally, other researchers discovered that R&D intensity is associated with the selection of CEOs having technical functional backgrounds (Datta and Guthrie, 1994). All of these studies—no matter how they classify organizational strategies—found empirical support of a correspondence between each type of leader and strategy; particularly, executives with primary experiences in output functions tend to pursue *exploration-related*—prospector or market-oriented—*strategies*, and those with primary experiences in throughput functions are likely to adopt *exploitation-related*—defender or efficiency-based—*strategies*.

Upper echelons scholars also find that organizations enjoy performance benefits when matching their strategies with leaders having specific functional experiences (Thomas and Ramaswamy, 1996). For example, in the study of Strandholm, et al. (2004), hospitals generally perform better when executive backgrounds align with strategy in the way described above. Similarly, Thomas, et al. (1991) concluded that the best-performing prospectors have CEOs with output functional backgrounds, while the best-performing defenders have CEOs with throughput backgrounds. The authors also reported that companies tend to perform less well when they have CEOs that do not fit their strategy (Thomas, et al., 1991). Studying business divisions within large corporations, Gupta and Govindarajan (1984) found business divisions with leaders having marketing experience enjoy higher performance when employing a “develop” strategy, which focuses on future growth, instead of a “harvest” strategy, which emphasizes current profits.

²¹ Strandholm, et al., (2004) used the terms external and internal operations, whose definitions are the same as those of output and throughput functions, respectively.

Finally, Beal and Yasai-Ardekani (2000) made two predictions: The R&D experience of a firm's CEO is more strongly related to its performance when the firm follows an innovation differentiation strategy, while the accounting experience of CEOs is more strongly associated with firm performance when the strategic emphasis is low-cost leadership. Their findings cannot reject the hypothesis of matching leader type to strategy. Moreover, the results suggest that innovation differentiation—a part of exploration—is enhanced by functional expertise of output leaders, while low-cost leadership—a part of exploitation—is improved by functional experiences of throughput CEOs (Beal and Yasai-Ardekani, 2000).

All of these studies suggest that organizations pursuing exploration-related strategies perform better when their leaders have experience in output functions, while those adopting exploitation-related strategies do better when they have throughput CEOs. Based on the above findings, I assume that a board of directors selects a new leader whose experiences and credentials fit a firm's strategic mandate, which is “a forecast of the future [strategic challenges] facing the corporation” (Vancil, 1987: 27).

Assumption 1: *Boards of directors select new leaders with experiences and credentials that fit their firms' strategic mandates.*

Endogenous Strategy Vacillation

Research on organizational vacillation suggests that vacillation among alternative organizational designs is a general principle with structural vacillation as an observed example (Nickerson and Zenger, 2002; Siggelkow and Levinthal, 2003; Gulati and Puranam, 2009; Boumgarden, et al., 2012). Nickerson and Zenger (2002) reported that some companies alter their formal structures between *centralization* that supports exploitation activity and *decentralization* that promotes

exploration activity. The purpose of the structural vacillation is to realize dynamic efficiency gains, defined as the benefits of “achieving temporary and intermediate levels of functionality that more closely approximate the desired functionality than that produced by either mode in steady state” (Nickerson and Zenger, 2002: 554). In addition to organizational structure, buyer-supplier relation is another decision a firm utilizes to obtain dynamic efficiency gains (Stevens, et al., 2012). Conducting a case study about Nissan’s buyer-supplier relation, Stevens and her colleagues observed that during an eight-year period, Nissan periodically alternated between the relational and transactional governance modes as a conscious effort to achieve intermediate levels of functionality that “incorporate elements of both governance modes” (Stevens, et al., 2012: 2).

Organizational vacillation theory suggests that structural vacillation is performance enhancing when a combination of exploration and exploitation is desired but cannot be achieved by each mode of organizational design (Nickerson and Zenger, 2002; Boumgarden, et al., 2012). The theory emphasizes that “performance is influenced by the levels of exploration and exploitation, and not merely their degree of balance or simultaneity,” where the level represents flow of investments into each type of activity (Boumgarden, et al., 2012: 588). The theory further shows, both analytically and empirically, that an effective means to elevate the levels of the two activities is temporally and sequentially vacillating between the structures that promote either exploration or exploitation, respectively (Nickerson and Zenger, 2002; Siggelkow and Levinthal, 2003; Gulati and Puranam, 2009).

To further delineate the relationships among exploration, exploitation, and economic performance, Boumgarden, et al. (2012: 592-593) depict a *performance landscape* that entails three relationships: (R1) Increasing the level of exploration or that of exploitation generates

performance because both activities are *necessary* in creating long-run performance (March, 1991). (R2) Increasing the level of one activity raises the marginal return of the other because the two activities also are *complementary* in generating long-run performance (Milgrom and Roberts, 1990; March, 1991). (R3) Increasing the level of one activity creates less and less marginal returns in performance because both exploration and exploitation follow the law of diminishing returns to scales (Boumgarden, et al., 2012).

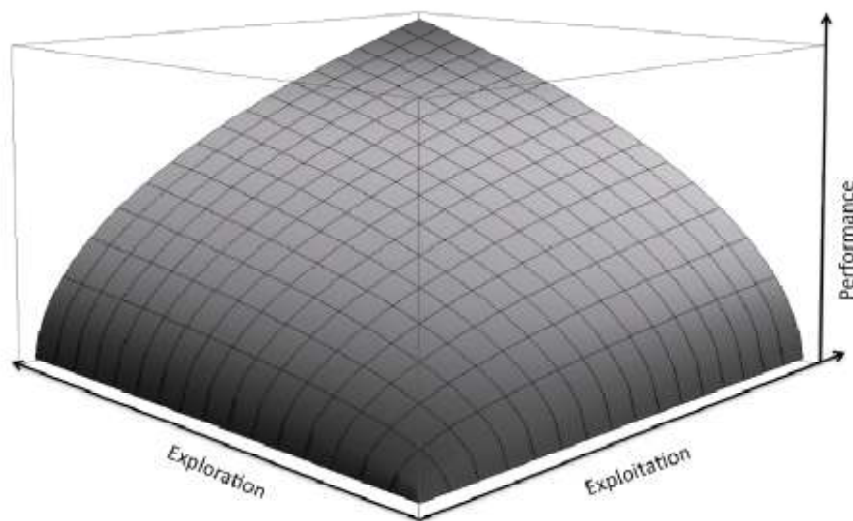


Figure 2. Performance Landscape (adapted from Boumgarden, et al., 2012).

Constructed by using these relationships, performance landscape is “a three-dimensional representation of the relationships among [exploration, exploitation, and economic performance],” where the first two are located along the x- and y-axes, and the performance is positioned vertically on the z-axis (see Figure 2). Boumgarden, et al. (2012: 595) maintained that structural vacillation “leads to a dynamic path on the landscape that traverses from one side of the landscape to the other” (Boumgarden, et al., 2012: 593). For the purpose of the current study, structural vacillation as well as the dynamic path on the landscape can be conceptualized as the product of a firm’s strategy vacillation.

To elaborate the conceptualization, imagine that when a firm focuses on exploration, the firm's level of exploration activities increases over time but the marginal return from increased level of exploration decreases (R1 and R3). At the same time, because of the complementarities of the two activities in generating organizational performance (R2), the more the level of exploration exceeds that of exploitation, the larger the opportunity costs of exploration and the larger the marginal return from increased level of *exploitation*. In other words, over time a strategic focus on exploration would create a firm's motivation for adopting exploitation strategies to approximately maximize the levels of the two activities (Boumgarden, et al., 2012). Likewise, over time a strategic focus on exploitation would create a firm's motivation for switching to exploration strategies. Therefore, to achieve high levels of long-run performance, organizations are likely to alternate their strategic focus between exploration and exploitation and to shift their structural choices between decentralization and centralization, respectively. The dynamic path on the landscape is thus a process of strategy vacillation, which is likely to result in structural vacillation and/or other vacillating decision patterns in governance modes (Nickerson and Zenger, 2002; Gulati and Puranam, 2009; Stevens, et al., 2012).

Assumption 2: Organizations seeking high levels of long-run performance are likely to sequentially alternate between exploration and exploitation strategies.

High Adjustment Costs for CEOs to Change the Nature of Strategies

Studies on expertise found that expert performance is achieved through two means: *deliberate and intense practice*, where people “receive immediate informative feedback and knowledge of results of their performance” for a minimum of ten years (Ericsson, Krampe, and Tesch-Römer, 1993: 367), and *progressive problem solving*, where individuals “tackle more complex representations of recurrent problems” rather than reducing problems to previously learned

knowledge and routines (Bereiter and Scardamalia, 1993: 94). Deliberate and intense practice emphasizes acquiring and accumulating knowledge and routines from both informative feedback and considerable time and efforts practicing a task (Ericsson, et al., 1993; Ericsson, 2006). Progressive problem solving, on the other hand, highlights finding and formulating recurrent problems in a more complex fashion through continual reinvestments of time and efforts freed by previously learned knowledge and routines (Bereiter and Scardamalia, 1993: 96-101; Scardamalia and Bereiter, 2006). I describe the two means in the following paragraphs, respectively.

In an article summarizing several studies on expert performance, Hayes (1985) reported that a necessary condition for one to reach expert level of performance in tasks such as chess and music is to have at least ten years—or 10,000 hours—of practice (Hayes, 1985). Ten-year rule is a heuristic indicating that a great amount of time and efforts is required before anyone can become an expert in a task (Ericsson, et al., 1993). For example, many professional careers, such as doctors, lawyers, accountants, scientists, athletes, and performers, demand deliberate practice and intense training in the beginning of their careers. A doctor must go through several years of education in the Medical School before she gets a residential internship, only after which an official job offer is possible. So as for a lawyer, an accountant, or a scientist, years of education and internship are necessary before one is accepted by her profession and the society. Similarly, for athletes and performers, there are sports institutes and musical schools as well as lots of trainings and exercises before they become professional athletes and musicians (Ericsson, et al., 1993). In summary, to become an expert and excel in one task requires deliberate and intense practice that takes a great amount of time.

An implication of the ten-year rule is that experts achieve high levels of performance only in their specialized tasks simply because the time for deliberate and intense practice is too long for them to master in another, unrelated tasks (Ericsson, Charness, Feltovich, and Hoffman, 2006). In addition, knowledge and routines acquired and accumulated through the deliberate and intense practice are limited to task-related problem solving, instead of general problem solving. For instance, cognitive psychologists found that compared with both amateurs and novices, chess masters were able to recall and reconstruct “real” chess positions with relatively few mistakes after viewing those positions in five seconds (de Groot, 1965; Chase and Simon, 1973). However, when shown “scrambled” chess positions that included pieces in implausible and even impossible locations, masters and others did not show systematic performance differences in the recall tests. The findings suggest that the expert advantage comes from familiarity with real chess positions that expert chess players have encountered through deliberate and intense practice instead of stemming from better memory or high intelligence that are attributable to general problem solving (Chase and Simon, 1973; Ericsson, 2006).

In a book on the nature and implication of expertise, Bereiter and Scardamalia (1993) proposed an approach to expertise by distinguishing experts from *experienced non-experts*, referring to those who spend considerable time practicing a task but do not achieve expert performance (Bereiter and Scardamalia, 1993). The difference between experts and experienced non-experts lies in the notion of progressive problem solving. To elaborate, I contrast the idea of deliberate and intense practice mentioned above with the notion of progressive problem solving. Through deliberate and intense practice, individuals acquire and accumulate knowledge and routines that reduce the time and efforts they had to spend in accomplishing a task. Through progressive problem solving, however, individuals reinvest the time and efforts freed by those

learned knowledge and routines in tackling more complex representations of recurrent problems (Bereiter and Scardamalia, 1993). In so doing, experts are likely to find and formulate new and sophisticated problem representations for a given task, increasing the likelihood of attaining better solutions and expert performance (Scardamalia and Bereiter, 2006).

A corollary of progressive problem solving is that experts must acquire and accumulate knowledge and routines in a progressive manner by tackling recurrent problems from simpler representations to more complex ones (Bereiter and Scardamalia, 1993). Namely, experts have gone through a path of progressive problem solving so that it is difficult for them to utilize knowledge and routines learned from a task to excel in another task when the two have distinct paths of progressive problem solving (Scardamalia and Bereiter, 2006).

For the purpose of the dissertation, I apply the two notions of deliberate practice and progressive problem solving to make an assumption about adjustment costs of organizational leaders in changing the nature of a firm's strategies. To obtain high levels of long-run performance, organizations must develop high levels of both exploration and exploitation activities (Boumgarden, et al., 2012), which constitute the two distinct tasks—or strategic mandates—for the organizations. Moreover, because exploration and exploitation are two tasks with disparate, or even conflicting, natures (March, 1991), they are likely to have distinct paths of progressive problem solving, each of which demands considerable time and efforts spent in deliberate and intense practice.

Two implications are derived to construct the assumption (A3). First, to be considered as a potential candidate of CEO successor, a leader must have invested and reinvested most of his or her time and efforts in either exploration or exploitation to excel in one of the tasks and to earn the corresponding experiences and credentials. Second, experts in exploration will

encounter great difficulties when they deal with strategic challenges or mandates relating to exploitation because it is unlikely, or at least very costly, for them to start over the path of progressive problem solving in exploitation. Similarly, experts in exploitation will suffer high adjustment costs when attempting to solve strategic problems of exploration.

Assumption 3: CEOs are experts in either exploration or exploitation, so they experience high adjustment costs in changing the nature of strategies.

Summary

The three assumptions are derived from research on upper echelons, organizational vacillation, and expert performance, respectively. In addition, the assumptions also are consistent with what I observed in the case of PepsiCo, where new leaders with appropriate experiences and credentials were selected to execute the ever shifting strategic mandates of the company. With the three assumptions derived from this chapter, I argue that the phenomenon of leadership vacillation occurs because some organizations dynamically balance exploration and exploitation by switching leaders. The theory and a dynamic system of leadership vacillation is elaborated in the next chapter.

Chapter IV: A Theory of Leadership Vacillation: Achieving Dynamic Balance by Switching Leaders

Introduction

Chapter III reviews the literatures on upper echelons, organizational vacillation, and expert performance and makes three corresponding assumptions. Building upon these assumptions, Chapter IV develops a dynamic system of leadership vacillation and elaborates a theory that explains the phenomenon's existence (Hypothesis 1). In addition, antecedents that lead to leadership vacillation are discussed (Hypotheses 2), and two sets of boundary conditions that constrain the appearance of the phenomenon are examined (Hypotheses 3). Finally, the chapter makes predictions on the performance implications of leadership vacillation, suggesting that organizations with leadership vacillation enjoy higher performance increases after CEO succession (Hypotheses 4). The following chapters then empirically test the four hypotheses: Chapter V assesses Hypothesis 1—the existence of leadership vacillation; Chapter VI examines both Hypothesis 2 and 3—its antecedents and boundary conditions; Chapter VII investigates Hypothesis 4—the performance implications of leadership vacillation.

Dynamic System of Leadership Vacillation

With the three assumptions, I depict a dynamic system of leadership vacillation (Figure 3) by focusing on the interactions among the board of directors, the CEO, and the firm. The board of directors makes successor choices (\mathbf{L}_n), which include output and throughput leaders (Hambrick and Mason, 1984; Thomas, et al., 1991). \mathbf{L}_n is a successor choice in period n , where $\mathbf{L}_n = [\mathbf{O}, \mathbf{T}]$. The assumption (A1) suggests that the board selects a new leader that is capable of dealing with a firm's strategic challenges and assigns the corresponding going-in mandates to the new leader.

The new leader, depending on the strategic mandates (S_n) he or she receives, will implement either exploration or exploitation strategies; the former emphasizes increasing the level of exploration activities, and the latter exploitation activities. S_n denotes strategic mandates at period n , where $S_n = [\text{explore}, \text{exploit}]$. The assumption (A3) states that over time the firm must change its strategies because high levels of *both* exploration and exploitation activities are necessary for its long-run survival and growth (March, 1991; Boumgarden, et al., 2012). However, the assumption (A2) implies that the incumbent CEO is less likely to be an appropriate leader to make the strategic changes because the incumbent would face high adjustment costs to do so. Moreover, the firm's performance is a function of the accumulated levels of exploration and exploitation activities with time delay. Finally, I include both the board's capacity and motivation to change leader types in the dynamic system to capture the boundary conditions of the phenomenon (Figure 3). A theory that explains the phenomenon's existence, antecedents, boundary conditions, and performance implications is described next, and the four corresponding hypotheses also are presented.

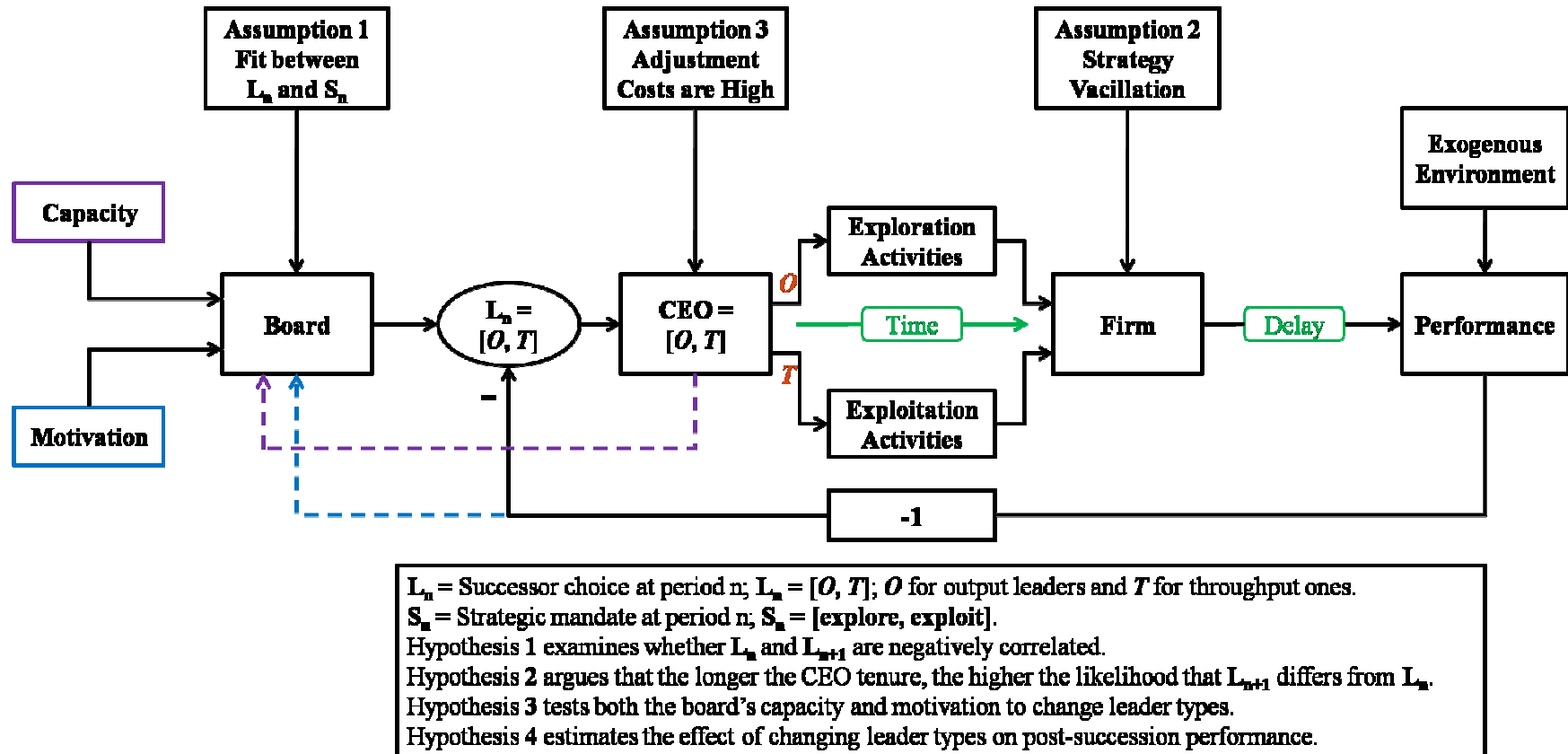


Figure 3. Dynamic System of Leadership Vacillation.

Existence of Leadership Vacillation

The existence of leadership vacillation can be observed in its partial and full form; while the former is a change in leader types between *two* successive leaders, the latter constitutes two consecutive changes in leader types among *three* successive leaders. I elaborate both the partial and the full forms of the phenomenon below.

From Output to Throughput Leader

Suppose that an organization has an output CEO who adopts exploration-related strategies. Over time, these strategies gradually increase the level of exploration activities but lead to “the costs of experimentation without gaining many of its benefits” (March, 1991: 71). A switching point is reached when *the expected marginal increase in performance from increased level of exploration* is equal to—and will be lower than—the *expected* marginal return from increased level of exploitation *minus* the costs of CEO succession (Figure 4).²² When an organization faces new strategic challenges of exploitation and the board formulates corresponding strategic mandates, the organization recruits a throughput successor to fit the mandate because the throughput leader—who spent most of his or her careers solving problems related to exploitation—is more effective in implementing exploitation strategies (Thomas, et al., 1991; Guthrie and Datta, 1997; Beal and Yasai-Ardekani, 2000; Barker and Mueller, 2002).

From Throughput back to Output CEO

A similar process occurs after the throughput CEO takes the helm. The throughput leader tends to adopt exploitation-related strategies, which at first increase the level of exploitation activities and reduce the gap between the two activity levels but over time lead to “suboptimal stable

²² Costs of CEO succession include *pre-succession* costs of searching for new CEOs and *post-succession* costs of learning for the new leaders to familiarize themselves with the job.

equilibria” owing to the lack of successful experimentation (March, 1991: 71). Likewise, when the expected marginal return from an increased level of exploitation is going to be lower than the expected marginal return from an increased level of exploration *minus* the costs of CEO succession, the organization is better to reverse its strategy back to exploration. The new strategic mandate then requires a leader adept in exploring, and an output CEO is likely to be chosen as the successor.

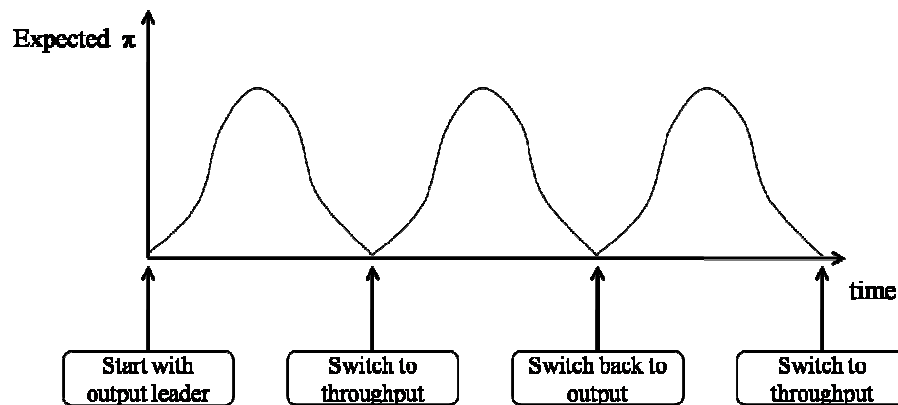


Figure 4. Leadership Vacillation Between Output and Throughput CEOs.

A pattern of vacillation appears when an organization experiences the aforementioned dynamics: A throughput CEO succeeds an output predecessor and is followed by another output successor (O-T-O). Similarly, T-O-T also constitutes a pattern of vacillation in CEO succession. Because the phenomenon of leadership vacillation consists of, at least, two consecutive changes in leader type, each change is a necessary condition for the phenomenon of leadership vacillation. I therefore distinguish the *full form* of leadership vacillation—O-T-O or T-O-T—from the *partial form*, which shows only one change in leader type (O-T or T-O). The partial form may arise because of the interruption of the process of dynamic balance. For example, the sample period may limit the data availability of a firm’s CEO succession, leading to a full form of leadership vacillation unobserved (by the researchers). Also, it is possible that the life of the firm has not been long enough to experience more turnovers, again leading to a partial form of vacillation.

Finally, CEO turnover due to exogenous events, such as the unexpected illness or death of incumbent leaders, also may lead to a partial form of leadership vacillation.

To achieve high levels of long-run performance, the theory contends, an organization sequentially selects two types of leaders to match its alternating strategic focus between exploration and exploitation, leading to changes in leader type among successive CEOs. When the process of achieving the dynamic balance is not interrupted, such as the three cases discussed above, the phenomenon of leadership vacillation appears in its full form. For example, PepsiCo displayed a vacillating pattern involving five CEOs: O-T-O-T-O. That said, changes in leader type between two successive CEOs (O-T or T-O) also represent a partial form of leadership vacillation because the theory predicts that an output leader who implements exploration strategy endogenously leads to the selection of a throughput leader, and vice versa.

The phenomenon reflects a series of deliberate successor choices made by organizations that match leadership with new strategic challenges to dynamically balance exploration and exploitation. In doing so, the organizations are likely to obtain high levels of both exploration and exploitation activities and to achieve long-run survival and growth. In particular, when one examines the functional origins of two successive CEOs in organizations, change is more likely than continuity: An output predecessor is likely to herald a throughput successor, while an output successor is likely to follow a throughput predecessor. Consequently,

Hypothesis 1a: *The functional origins of two successive CEOs— L_n and L_{n+1} —are more likely to be different in CEO succession (Partial form).*²³

Hypothesis 1b: *In addition to the partial form, the functional origins of L_n and L_{n+2} are more likely to be the same in CEO succession (Full form).*

²³ L_n , L_{n+1} , and L_{n+2} represent three consecutive CEOs in a company.

Antecedents of Leadership Vacillation

Upper echelons researchers theorized and found a tendency for top leaders to exhibit stability in organizational strategies (Finkelstein and Hambrick, 1990; Miller, 1991; Miller and Shamsie, 2001). Top executives with longer tenure tend to be cognitively biased toward the *strategic status quo* (Hambrick and Fukutomi, 1991; Hambrick, Geletkanycz, and Fredrickson, 1993; Rumelt, 1995). Long-tenured executives thus become impediments to the growth of firms because growth requires a series of strategic changes between exploration and exploitation (Sørensen, 1999; Boumgarden, et al., 2012). Also, studies on expert performance suggest that high adjustment costs would incur when the leaders attempt to make the changes. Accordingly, the longer an output (throughput) CEO takes the helm, the more the levels of exploration (exploitation) activities will be increased, compared to the increase in the other activities.

Because each type of leader implements one type of strategy that emphasizes accumulating the levels of the corresponding activities, over time the two levels of exploration and exploitation activities will become more and more “unbalanced” to the extent that the two complementary activities (March, 1991; Boumgarden, et al., 2012) fail to generate performance (Figure 5). To further explicate the notion of *unbalance* between the two activities, take an extreme case of a perfect complement for example, such as a left shoe and a right. A left shoe generates value to an individual if and only if there is a right shoe to accompany with it. With both left and right shoes, suppose that the individual gets a particular level of utility, U_1 . Higher level of utility, $U_2 (> U_1)$, cannot be achieved by adding either left or right shoe but both. If the individual receives one more left shoe, there is an unbalance between the two perfect complements. The solution to the unbalanced situation is to purchase another right shoe to achieve higher level of utility U_2 . Although exploration and exploitation activities are not perfect

complements, the notion of unbalance still applies when one type of activities accumulates faster than the other for a long period of time. Consequently, the larger the unbalance between the two activities, the greater the benefits to emphasize and accumulate the other type of activities, leading to a higher probability of selecting a successor with different leader type. As a result, the theory predicts that a departing CEO's tenure is positively correlated with the likelihood of leadership vacillation.

Hypothesis 2a: *The longer a departing CEO's tenure, the higher the likelihood of changes in leader type.*

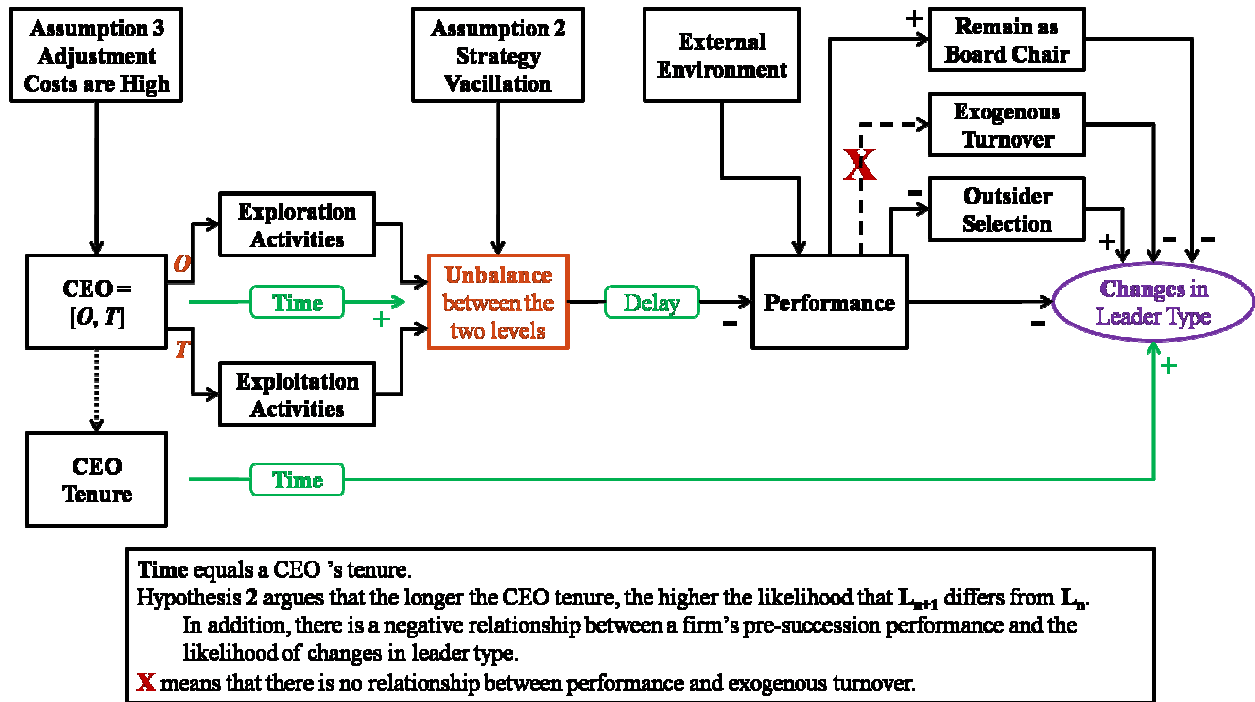


Figure 5. Antecedents of Leadership Vacillation.

Furthermore, a firm's performance *mediates* the relationship between CEO tenure and the likelihood of leadership vacillation because the firm's performance is a function of the two levels of complementary activities. Over time the increasingly unbalanced levels of activities will decrease the firm's performance, leading to higher likelihood of leadership vacillation (Figure 5).

Hypothesis 2b: *A firm's pre-succession performance mediates the relationship between a departing CEO's tenure and the likelihood of changes in leader type. In addition, there is a negative relationship between a firm's pre-succession performance and the likelihood of changes in leader type.*

A caveat is that the performance also is influenced by external environmental variables, and thus may be a noisy signal for the board to infer the degree of unbalanced levels of the two activities. Hence CEO tenure may be a better antecedent than the performance of a firm in predicting the likelihood of leadership vacillation. That said, a firm's performance has impacts on three indicators that can predict the likelihood of leadership vacillation. (1) An indicator that the departing CEO remains as the chairman of the board. (2) An indicator for exogenous events that lead to CEO turnover, which is a "complement"²⁴ for turnover events that are due to performance-related issues. (3) an indicator for outsider as the successor CEO. I describe the three indicators below and explain the relationships between these indicators and the likelihood of leadership vacillation.

At the time of a leader's retirement, the higher the performance of a firm, the more likely the board perceives the current strategic focus as valid and the higher the likelihood that the departing CEO will remain as the chairman of the board. Accordingly, the indicator that the departing CEO's remains as the board chair is positively correlated with the probability that the board would select a successor with the same functional background as that of the predecessor, which constitutes no vacillation. A recent empirical study found that a firm is less likely to make strategic change when an incumbent CEO retires but *remains as the chairman* of the board (Quigley and Hambrick, 2012). The study implies that appointing a predecessor CEO as the

²⁴ The reason to use exogenous turnover is explained later. The term *complement* is used here as in the set theory.

board chair is a signal that the board does not seek for higher performance or does not perceive a shift in strategy is necessary²⁵ (Quigley and Hambrick, 2012). Consequently, when a departing CEO remains as the chairman of the board, the firm is less likely to select a new leader with different functional origin. Hypothesis 2b is consistent with the observation that *the likelihood of changes in leader type is lower when a departing CEO remains as the board chair*.

Similarly, when a leader leaves the office because of death, illness, or other career opportunity, which are exogenous events for an organization, the board will not perceive a shift in strategy is necessary because these exogenous turnovers, by definition, are not resulted from performance-related issues—or the unbalance between exploration and exploitation activities. The theory predicts a lower likelihood of changes in leader type when CEO turnover can be attributed to exogenous events, such as death, illness, or pursuing better job offers. Therefore Hypothesis 2b is consistent with the observation that *the likelihood of changes in leader type is lower when a departing CEO leaves the office because of exogenous events*.

Finally, studies on outsider selection found that poor pre-succession performance is positively associated with the selection of an outside successor (Dalton and Kesner, 1985; Cannella and Lubatkin, 1993; Shen and Cannella, 2002; Karaevli, 2007). These studies also found that outsiders are likely to possess different functional origins than the incumbents (Hambrick and Fukutomi, 1991; Zajac and Westphal, 1996). Moreover, research shows that strategic persistence is negatively related to the likelihood of outsider selection (Zhang and Rajagopalan, 2003), implying a positive relationship between outsider selection and changes in leader type. Consequently, Hypothesis 2b is consistent with the observation that *there is a positive relationship between outsider selection and the likelihood of changes in leader type*.

²⁵ I exclude departing CEOs who remained as the board chair because of normal CEO transitions. In addition, I assume that departing CEOs stayed as the chairman for less than a year for normal transitions. See Measure section.

Boundary Conditions of Leadership Vacillation

The boundary conditions of leadership vacillation are the conditions under which the three assumptions may not hold, reducing the likelihood that the phenomenon appears. Accordingly, three sets of boundary conditions can be derived from relaxing the three assumptions. In particular, the assumption (A1) implies that the board of directors has control over CEO to select appropriate successors. The first set of boundary conditions thus relates to a board's *capacity* to change leader type. In addition, the second set of boundary conditions—which relates to the assumption (A2)—examines conditions under which organizations have no need of strategy vacillation and hence no need of leadership vacillation, either. This set of boundary conditions is about a board's *motivation* to change leader type. Finally, the assumption (A3) states that CEOs are experts in either exploration or exploitation so that the board of directors must choose between these two leader types. For the sake of comprehensiveness, I discuss the set of boundary conditions under which the assumption (A3) does not hold; that is, individual leaders may overcome the high adjustment costs of switching strategies. If incumbent leaders can be experts in both types of strategies, there are no meaningful leader types and no theoretical foundation for leadership vacillation. Consequently, the dissertation does not further explore the validity of the assumption and reserves the issue for future research.

A Board's Capacity to Change Leader Type

A board of directors' capacity to make decisions is referred to as a board's independence from or its control over CEO (Westphal and Zajac, 1995). The board's independence includes its capacity to select new CEO that is suitable to resolve a firm's strategic challenges. However, the capacity may be limited when board control is relatively weak compared to CEO control. Namely, the board's capacity to choose a new leader with different leader type is constrained by

incumbent CEO who is likely to prefer a successor with similar demographic backgrounds, including successor functional origins (e.g., McPherson, Smith-Lovin, and Cook, 2001). When the departing CEO has more decision controls over the board in selecting new leader, the likelihood that a different type of leader will be chosen is reduced and the probability of leadership vacillation also is decreased. In other words, the board's independence from CEO is positively related to the probability of leadership vacillation. Thus the first set of boundary conditions entails those conditions under which the board of directors is independent from the incumbent CEO.

Hypothesis 3a: *There is a positive relationship between a board's independence from CEO and the likelihood of changes in leader type.*

Four conditions affect a board's independence from CEO: (1) the size of the board, (2) the average tenure of the board members, (3) the proportion of insider directors, and (4) the proportion of independent directors.

The size of the board has two implications that affect the likelihood of leadership vacillation. The larger the size, the less likely that the board would be able to negotiate as a whole coalition (Olson, 1965). In addition, the larger the size, the bigger the inertia of making any change, including selecting a successor with different leader type. Both implications decrease the probability of leadership vacillation. Hypothesis 3a is consistent with *a negative relationship between a board's size and the likelihood of changes in leader type.*

In addition to the size of the board, the average tenure of the board members also affects the board's control over the CEO. Specifically, the board's control increases with the increase in the average tenure of directors because the tenure usually is accompanied by both knowledge of

the focal company and the ability of the director. A board mostly consisting of long-tenured directors has larger influence over the CEO than a board mostly composed of short-tenured directors. Therefore a board's average tenure is positively correlated with its control over CEO and also is positively related with the likelihood of leadership vacillation. Note that CEO is usually a member of the board or even the chairman of the board, so the incumbent CEO's tenure will also increase with his or her control power over the board. The average tenure of the board members should exclude the tenure of the incumbent CEO. Namely, Hypothesis 3a is consistent with *a positive relationship between a board's average tenure, excluding CEO tenure, and the likelihood of changes in leader type*.

The final two conditions relate to the composition of the board because the composition affects the relationship between the directors and the incumbent CEO, and the relationship influences the board's control over CEO (Finkelstein, et al., 2009). The closer the relationship between a director and CEO, the higher the likelihood that the director is biased toward the opinions of the CEO. The board composition constitutes three types of directors: employee, who is also a director; affiliated director, who has some affiliation to the firm;²⁶ and independent director, who is neither employed by nor affiliated with the focal company except for the membership of the board. An employee is expected to have the closest relationship with the CEO, an affiliated director next, and an independent director least. Accordingly, an insider director has least control over the CEO, while an independent director has the most control and an affiliated director has control somewhere in the middle of the other two types of directors.

When a board contains more insider directors, the board's control over CEO is reduced. On the

²⁶ For example, a director may be a former employee of the company or of a majority-owned subsidiary; a provider of professional services, such as legal, consulting, or financial services, to the company; a customer of, or supplier to the company; a director who controls more than 50% of the company's voting power (and thus would not be considered to represent the broader interests of minority shareholders); a family member of an employee; or an employee of an organization or institution that receives charitable gifts from the company.

contrary, if a board sits higher proportion of independent directors, the board is likely to gain more control over CEO. Therefore, when a board is relatively independent, it is more likely to select a different type of successor when the nature of a firm's strategic challenges changes. Hypothesis 3a is consistent with a *negative* relationship between the proportion of inside directors and the likelihood of changes in leader type. Moreover, it also is consistent with a *positive* relationship between the proportion of independent directors and the likelihood of changes in leader type.

A Board's Motivation to Change Leader Type

When organizations meet their performance aspiration, they are likely to be satisfied with the existing levels of exploration and exploitation activities as well as the current strategy, thus reducing their motivation to alternate between the two strategies. Consequently, the board of directors is less likely to consider a successor with different leader type because the incumbent or a new CEO with the same leader type is a straightforward choice. In other words, organizations meeting their performance aspiration lack the motivation to change leader type, leading to a lower likelihood of leadership vacillation. The behavioral theory of firm provides the theoretical foundation for exploring the second set of boundary conditions because the behavioral theory offers predictions to the conditions under which organizations—or boards of directors—have no motivation to change. That is,

Hypothesis 3b: *The larger the amount that a firm's aspiration level exceeds its realized performance, the higher the likelihood of changes in leader type.*

An organization is motivated to change because its realized performance is below the aspiration level. Two kinds of aspirations affect an organization's motivation to change,

including changes in strategies, CEOs, or leader types; one is competitive aspiration level and the other historical aspiration level. Competitive aspiration is shaped by an organization's social comparison with its competitors' performance (Festinger, 1954; Cyert and March, 1963). Historical aspiration, however, is formed based on the organization's past performance (Cyert and March, 1963; Greve, 1998). In particular, four conditions concerning these two aspirations lead to a board's motivation to change: (1) concentration of the industry within which the focal firm competes, (2) relative market share of the firm, (3) the amount of a firm's performance decreases, and (4) the frequency of a firm's performance decreases. While the first two conditions are associated with competitive aspiration, the last two are related to historical aspiration.

An industry forms the task environment around a focal company, which competes with its rivals within the industry. As a result, the concentration level of the industry has an effect on how the focal firm generates its competitive aspiration. If the concentration level of the industry is high, which indicates that the industry is more likely to be a stable task environment. According to the traditional structure-conduct-performance paradigm, high market concentration leads to a stable environment because it increases the likelihood of tacit collusion and stable rules of competition among rivals within the industry (Caves and Porter, 1978). Accordingly, the competitive aspiration also is likely to stable, reducing the focal firm's frequency to switch its current strategy and hence decreasing the likelihood of leadership vacillation. That is, Hypothesis 3b is consistent with *a negative relationship between an industry's concentration level and the likelihood of changes in leader type*.

Relative market share—the ratio of a focal firm's market share against that of its strongest competitor—also shapes a firm's competitive aspiration because of two reasons. First,

market share often is used as a performance target by business organizations (Buzzell and Wiersema, 1981), and second, the larger the gap between a firm's market share and that of the market leader, the stronger the firm's motivation to foster changes to catch up the leader. The index of relative market share is thus negatively correlated with the firm's motivation to change, decreasing the likelihood of leadership vacillation. The extreme case is the market leader, whose relative market share equals to one and its motivation to change is minimum because the existing strategy is likely to be satisfactory to the leader. Hypothesis 3b is consistent with *a negative relationship between a firm's relative market share and the likelihood of changes in leader type*.

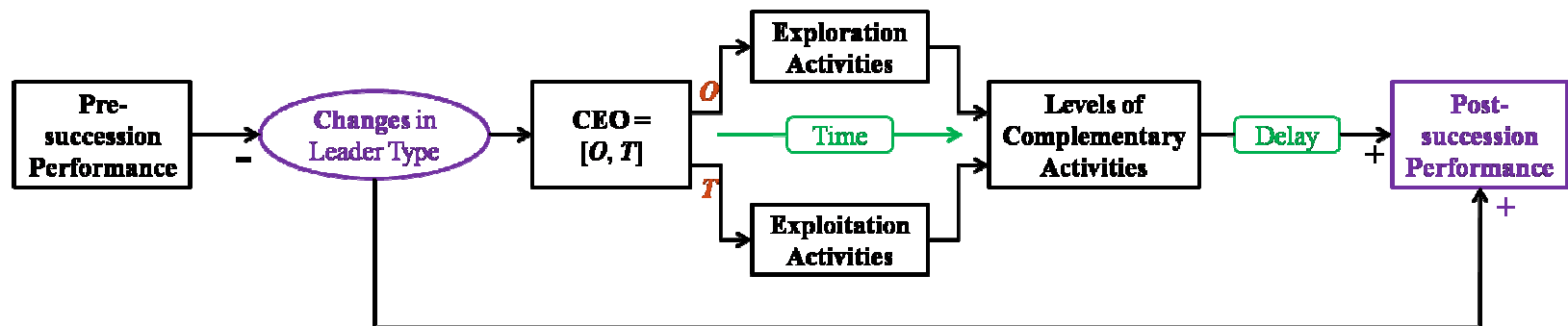
Historical aspiration level has an impact on the board's motivation to change because organizations also regard their past returns as a performance target (Greve, 2003). Two forces jointly contribute to the impact of past returns on the board's motivation to change: the *amount* and the *frequency* of decreasing returns. The amount of decreasing returns represents the gap between the realized returns and the past returns when the former is smaller than the latter. The frequency of decreasing returns corresponds to a performance record of decreasing returns in consecutive years. On the one hand, when the realized returns are significantly smaller than the historical aspiration level, the company's motivation to change increases. On the other hand, when the company experienced performance decreases in consecutive years, its motivation to change increases even if the realized returns are only slightly smaller than the aspiration level. In other words, even the smallest amount of decreasing returns have a strong impact on the motivation to change if the frequency is too high. Namely, Hypothesis 3b is consistent with *a positive relationship between the amount of decreasing returns and the likelihood of changes in leader type*. Moreover, it also is consistent with *a positive relationship between the frequency of decreasing returns and the likelihood of changes in leader type*.

Performance Implications of Leadership Vacillation

Organizational vacillation theory predicts that by alternating between discrete structural choices (e.g., centralization and decentralization), organizations achieve high levels of exploration and exploitation and thus high levels of long-run performance. However, leaders play no role in the organizational vacillation theory and are implicitly assumed to be equally effective in organizing centralized and decentralized structures or in managing market and relational governance modes. Both the assumptions (A1) and (A3) found the opposite: Leaders differ in their effectiveness in implementing exploration and exploitation strategies because they are likely to be experts in one of the strategies. Structural vacillation alone may not be sufficient to achieve the first-order dynamic efficiency (c.f., Nickerson and Zenger, 2002). Building upon organizational vacillation, the theory developed in the dissertation highlights the role of disparate leader types on generating performance advantages. As a result, the theory predicts that leadership vacillation—alternating between discrete types of leaders (i.e., output and throughput CEOs)—has positive performance impacts. The positive performance increases are due to the increases in the levels of complementary activities through switching leaders and strategic mandates (Figure 6). Organizations that have two successive CEOs with different functional origins enjoy performance increases, compared to those that have two successive CEOs with the same leader types.

Hypothesis 4: The performance effect of changes in leader type is positive and significant. That is, organizations with changes in leader type enjoy higher performance increases than those without changes.²⁷

²⁷ Table 1 summarizes the four hypotheses.



Levels of complementary activities represent the accumulated levels of exploration and exploitation. Hypothesis 4 examines the treatment effect of changes in leader type on a firm's post-succession performance.

Figure 6. Performance Effects of Leadership Vacillation.

Table 1. Model Hypotheses.

* While O means that the hypothesis cannot be rejected, **X** represents that the result is not consistent with the hypothesis.

Existence of Leadership Vacillation

Hypothesis 1a: The functional origins of two successive CEOs—leader_n and leader_{n+1}—are more likely to be different in CEO succession (Partial form). [O]

Hypothesis 1b: In addition to the partial form, the functional origins of leader_n and leader_{n+2} are more likely to be the same in CEO succession (Full form). [O]

Antecedents of Leadership Vacillation

Hypothesis 2a: The longer a departing CEO's tenure, the higher the likelihood of changes in leader type. [O]

Hypothesis 2b: A firm's pre-succession performance mediates the relationship between a departing CEO's tenure and the likelihood of changes in leader type. In addition, there is a negative relationship between a firm's pre-succession performance and the likelihood of changes in leader type. [**X**]

- (1) When a departing CEO remains as the chairman of the board, the likelihood of changes in leader type is lower. [O]
 - (2) When a departing CEO leaves the office because of exogenous events, the likelihood of changes in leader type is lower. [O]
 - (3) There is a positive relationship between outsider selection and the likelihood of changes in leader type. [**X**]
-

Boundary Conditions: A Board's Capacity to Change Leader Type

Hypothesis 3a: There is a positive relationship between a board's independence from CEO and the likelihood of changes in leader type.

- (1) There is a negative relationship between a board's size and the likelihood of changes in leader type. [O]
- (2) There is a positive relationship between a board's average tenure, excluding CEO tenure, and the likelihood of changes in leader type. [O]
- (3) There is a negative relationship between the proportion of inside directors and the likelihood of changes in leader type. [O]
- (4) There is a positive relationship between the proportion of independent directors and the likelihood of changes in leader type. [**X**]

Table 1. Model Hypotheses (Cont.)

Boundary Conditions: A Board's Motivation to Change Leader Type

Hypothesis 3b: The larger the amount that a firm's aspiration level exceeds its realized performance, the higher the likelihood of changes in leader type.

- (1) An industry's concentration level is negatively correlated with the likelihood of changes in leader type for organizations in the industry. [O]
 - (2) There is a negative relationship between a firm's relative market share and the likelihood of changes in leader type. [X]
 - (3) There is a positive relationship between the amount of decreasing returns and the likelihood of changes in leader type. [X]
 - (4) There is a positive relationship between the frequency of decreasing returns and the likelihood of changes in leader type. [O]
-

Performance Implications of Leadership Vacillation

Hypothesis 4: The performance effect of changes in leader type is positive and significant. That is, organizations with changes in leader type enjoy higher performance increases than those without changes. [O]

Chapter V: Existence of Leadership Vacillation:

An Empirical Study

Introduction

In chapter II, a case study of a novel phenomenon of CEO succession—leadership vacillation—is presented. While the case study has merits in exploring new phenomenon and showing that a phenomenon “exists,” it does not provide sufficient evidence that the phenomenon is non-random and common, two criteria that should be met before further research efforts are devoted. In particular, it is essential to assess whether or not leadership vacillation is common rather than idiosyncratic and to show that leadership vacillation is not random but a product of deliberate choice because these conditions are suggestive of a novel general phenomenon.

This chapter addresses these two criteria and shows the existence of leadership vacillation by conducting an empirical analysis based on a large sample of firms, which complements the case study method. A dataset of 569 CEOs in 200 large, public companies is compiled and a Chi-square test employed to examine whether the phenomenon exists in many firms without being a product of chance. The analysis indicates that leadership vacillation is a non-random and common organizational phenomenon.

Issue of Estimation

Leadership vacillation is common when it can be observed in a number of firms, instead of just in the one case of PepsiCo. Moreover, the phenomenon is non-random if it is the outcome of deliberate choice and not merely the result of chance, which also could produce a vacillating CEO succession pattern without the mechanism proposed by the theory of leadership vacillation. Hypothesis 1 about the existence of leadership vacillation is tested against the two criteria.

Sample and Data Sources

To assess whether leadership vacillation is likely to occur in organizations *that desire long-run survival and growth*, the study must find an appropriate sample constituting those organizations. A recent list of the Fortune 500 arguably includes organizations *that have survived and grown for a long period of time* because these companies have the largest sales in the United States and the youngest of them is at least 12 years old.²⁸ In two winnowing steps, 200 firms are chosen from the list of 2011 Fortune 500 Companies before the data about their CEO successions are collected (Table 2). First, I exclude 55 private companies in the list because they do not face the same growth pressure from the stock market as do the public companies. Second, 68 companies that have had only one leader—hence no CEO succession—during the sampling period are further excluded. From the 377 companies remaining, I randomly draw 200 to balance between a meaningful size for a statistical test and the high cost of data collection. The random sample generates an unbalanced panel dataset that contains 3,676 firm-year observations, which are enough for statistical significance. Information about the CEO successions of these 200 firms is obtained from the *Compustat Executive Comp* database, which includes data about CEOs since 1992. I trace the tenure of the CEO appeared in each firm at 1992, so there is no left censoring in terms of CEO tenure. Out of the 569 leaders, 200 are incumbents. Thus 369 leaders had turnover. Note also that 28 interim CEOs are dropped because they are not the final successor choices made by the boards of directors. In total, 569 leaders and 369 CEO succession events are identified.

²⁸ The youngest company in my sample went in public after 2000. It means that the company was founded at least 12 years ago.

Table 2. Criteria of Sample Selection.

Step 1: The list of 2011 F500. Drop 55 private companies.

	One CEO	Two CEOs	Three CEOs	Four CEOs	Five CEOs	Total
Number of Firms	68	137	132	84	24	445

Step 2: Drop 68 firms that have only one leader, choose 200 firms, and then drop interim CEOs from the 200 firms (28 interim CEOs).

	One CEO	Two CEOs	Three CEOs	Four CEOs	Five CEOs	Total
Number of Firms	0	75	85	36	4	200
Total Number of CEOs	0	150	255	144	20	569

Measures

Dependent Variables

To test Hypotheses 1a and 1b, the dissertation examines both the partial form and the full form of leadership vacillation by employing two dependent variables, respectively: an operational measure of changes in leader type ($\Delta TYPE$) between two CEOs, which is an indicator variable that equals one if the functional origin of a successor is different from that of a predecessor, and an operational measure of leadership vacillation among three successive CEOs. That said, it is complicated to obtain the two operational measures because both require not only objective data collection but also subjective judgment about their measurement. The procedures used to measure the two variables are described below.

Data collection about CEO functional origins is rather objective. The data are collected from various sources because there is no single source containing information about all leaders in the 200 firms. Company websites offer profiles of all incumbent leaders and some of their predecessors. Data regarding the remaining predecessors are collected from Forbes profiles of

business leaders, Hoover's Online Business Network, NNDB database,²⁹ Bloomberg Business Week executive profile, and Dun and Bradstreet reference book of corporate managements. Obituaries in Wall Street Journal, New York Times, or local newspapers are used to collect data about a small number of leaders whose information is not found in the previous databases. Except for these few leaders, information about most leaders is independently collected from at least two sources to double check its reliability.

To determine what categories of functions should be included in the analysis, however, requires subjective judgment. I first consult the classification of *Forbes*, which assigns functional backgrounds into nine categories: "technical, production, sales, marketing, finance, operations, medical, journalism, and legal" (e.g., Ocasio and Kim, 1999: 543). New and distinct functions are observed during the data collection process, however, such as founder entrepreneur, strategic planning, research and development (R&D), and human resources. In order to be both accurate and parsimonious, the study collapses functional origins into ten categories: (1) consulting and strategic planning, (2) founder entrepreneur, (3) sales, marketing, and merchandising, (4) product R&D and technology, (5) general management, (6) process engineering, (7) finance and accounting, (8) production, manufacturing, and operation, (9) law and general counsel, and (10) other functions, such as human resource and industrial relation.³⁰ Moreover, the study classifies these ten functional backgrounds into the two types—output and throughput functions—based on the categorization used by upper echelons research (Hambrick and Mason, 1984; Thomas, et al., 1991). Categories 1, 2, 3, 4, and 5 are classified as output functions, while those of 6, 7, 8, 9, and 10 are classified as throughput functions.

²⁹ NNDB is an intelligence aggregator that tracks the activities of people determined to be noteworthy, both living and dead. Superficially, it seems much like a "Who's Who" where a noted person's curriculum vitae is available, including information such as date of birth, a biography, and other essential facts.

³⁰ Note that (5) general management does not include President or Chief Operating Officer (COO) because almost every leader has been President or COO before they assumed the office. Therefore these titles are not discriminating.

In addition to leaders' primary functional backgrounds, data about their secondary backgrounds are collected because the measure of leadership vacillation becomes ambiguous if some leaders had worked in multiple functional areas that cover both output and throughput functions. A leader is defined as having a secondary background when he or she had worked in another functional area for more than 5 years.³¹ There are 67 leaders—13% of all leaders in the sample—with a secondary function. However, only 30 of them had worked in both output and throughput functions, and the other 37 CEOs had worked in either output functions or throughput ones.³² Empirically, few leaders had worked in both output and throughput functions, reducing the measurement error of leadership vacillation.

Operational Measure of Changes in Leader Type ($\Delta TYPE$). An empirical assessment of the partial form of leadership vacillation requires a variable indicating changes in leader type between two successive CEOs (Hypothesis 1a). $\Delta TYPE$ is coded as one if the functional origin of a successor is different from that of a predecessor. Namely, both the pattern of output-to-throughput CEO (O-T) and that of throughput-to-output CEO (T-O) represent changes in leader type, and the patterns of O-O and T-T represent no change.

Operational Measure of Leadership Vacillation. While examining the partial form of leadership vacillation calls for a measure that includes only two CEOs, the analysis of the full form must operationally measure the phenomenon for at least three CEOs (Hypothesis 1b). Although leadership vacillation is theoretically defined as the times when organizations alternate between output and throughput leaders, the phenomenon's operational measure remains an

³¹ I used other thresholds such as 3 years and 7 years; the resulting number of CEOs that have second functional experiences varies little. In robustness checks, the coefficient magnitudes, directions, and statistical significance also change little.

³² For example, a leader who had worked in both finance and manufacturing is classified as throughput-oriented, causing no measurement ambiguity. But a leader whose primary functional background is marketing but secondary functional background is accounting is classified as either output-oriented or throughput-oriented.

empirical choice: Should two, three, or more successive leaders be included in the measure? Empirically, given a period of time, an operational measure that includes more (fewer) successive leaders identifies fewer (more) companies as the ones having leadership vacillation. Neither a measure that identifies too many vacillating firms, nor that identifies too few, is a good empirical choice because the measure would have little discriminating power in separating firms with leadership vacillation from those without leadership vacillation. As a result, the study adopts the operational measure that encompasses two succession events (with three leaders) because both the measure with one succession and that with three successions have disadvantages: The measure with only one succession event is the partial form of leadership vacillation and cannot be used to test the full form; the measure consisting of three succession events involves too few companies in the sample (i.e., only 40 firms), rendering the measure less informative. So the operational measure of leadership vacillation adopted in the analysis includes the patterns of output-throughput-output (O-T-O) and throughput-output-throughput (T-O-T). Other patterns, such as output-throughput-throughput (O-T-T), output-output-output (O-O-O), and output-output-throughput (O-O-T), do not represent leadership vacillation. Table 3 lists the definitions and measurements for all the variables employed in the dissertation.

Method: A Chi-Square Test

To examine the partial form of leadership vacillation (Hypothesis 1a), the study compares the number of paired successive CEOs having different functional origins with that of paired successive CEOs having the same functions. If the number of firms with $\Delta TYPE = 1$ is significantly greater than that of firms without changes in leader type ($\Delta TYPE = 0$), Hypothesis 1a of the partial form of leadership vacillation cannot be rejected: Change in the functional backgrounds between two successive CEOs is more likely than continuity.

Table 3. List of Variables: Definitions and Measurements

<i>Existence of Leadership Vacillation</i>
Hypothesis 1a: Changes in Leader Type (<i>ΔTYPE</i>): <i>ΔTYPE</i> is defined as the change, or non-change, in the types of leader between two consecutive CEOs. <i>ΔTYPE</i> is coded as 1 if the functional origin of a successor is different from that of a predecessor, and 0 otherwise.
Hypothesis 1b: Operational Measure of Leadership Vacillation: The operational measure is defined as the vacillating pattern of leader types among three consecutive CEOs. Leadership vacillation = 1 for either Output-Throughput-Output (O-T-O) or Throughput-Output-Throughput (T-O-T).
<i>Antecedents of Leadership Vacillation</i>
Exclusion Restrictions: CEO stockholding (<i>ceo_holding</i>) is defined and measured as the ratio of a CEO's stocks to the firm's outstanding stocks. CEO age (<i>ceoage</i>) is defined and measured as a CEO's age.
Hypothesis 2a: CEO tenure (<i>ceo_tenure</i>) is defined and measured as a CEO's years in the office. <i>sq_tenure</i> , is the square term of the tenure.
Hypothesis 2b: A firm's pre-succession performance (<i>pre-succession performance</i>) is a set of six variables proposed by Kaplan and Minton (2012).
<i>rtn_sp500</i> is measured as the annual return on the S&P 500 index. The variable <i>rtn_ind</i> is measured at the two-digit SIC code and equals the difference between the return on the median firm in the two-digit SIC industry and the return on the S&P 500 index. Moreover, <i>rtn_frm</i> equals to the firm stock return minus the return for the median firm in the same two-digit SIC code. <i>lag_rtn_sp500</i> , <i>lag_rtn_ind</i> , and <i>lag_rtn_frm</i> are the three lagged stock returns, respectively.
(1) Remaining as board chair (<i>d_chairman</i>) is defined when a departing CEO remains as the chairperson of the board. It is measured as 1 if the CEO remains as the chairman of the board longer than <i>one</i> year after his or her turnover, and 0 otherwise.
(2) Exogenous turnover event (<i>d_exogen</i>) is defined as a CEO succession event that is unexpected by the board of directors. It is coded as 1 if the turnover is due to a CEO's death, illness, or pursuing other career opportunity, and 0 otherwise.
(3) Outsider selection (<i>d_outsider</i>) is defined when the board selects a successor who is not an employee of the focal firm. It is coded as 1 if the successor was not an employee of the focal firm <i>two years</i> before he or she assumes the office, and 0 otherwise.

Table 3. List of Variables: Definitions and Measurements (Cont.)

<i>Boundary Conditions of Leadership Vacillation</i>
Hypothesis 3a: A Board's Capacity to Change Leader Type
(1) A board's size (b_size) is the number of directors in the board.
(2) A board's average tenure (mean_dirtenure) is the mean of all directors' tenure excluding CEO tenure.
(3) A board's proportion of insider directors (p_insider) is the ratio of the number of inside directors to the size of the board.
(4) A board's proportion of insider directors (p_independent) is the ratio of the number of independent directors to the board size.
Hypothesis 3b: A Board's Motivation to Change Leader Type
(1) An industry's concentration level represents its competitive intensity. It is measured as the four-firm concentration ratio (concentration4), which is calculated by dividing the sales of the four largest firms by the industry sales.
(2) A firm's relative market share (rel_mks) is the ratio of a focal firm's revenues to the sales of the market leader.
(3) The amount of decreasing returns (hist_roa) is the gap between a firm's performance at year t and that at year t-1. It is measured as the return on assets (ROA) at year t-1 minus ROA at year t. Thus the larger the variable of hist_roa , the larger the amount of decreasing returns.
(4) The frequency of decreasing returns (trend_roa) is defined as the consecutive years that a firm experiences decreasing returns. It is measured by the number of years that a firm encountered decreasing ROA. The variable is an integral variable between 0 to 3. If trend_roa = 3, it means that the firm experienced decreasing ROA for three consecutive years. If trend_roa = 0, then the firm experienced performance increase.
<i>Performance Implications of Leadership Vacillation</i>
Hypothesis 4: The performance effect of changes in leader type (post_Δroa) is measured as the change in ROA one year after a CEO turnover. post2yr_Δroa and post3yr_Δroa , are measured by the changes in ROA two and three years after the turnover, respectively.

To show the full form of leadership vacillation (Hypothesis 1b), the study first assesses whether leadership vacillation is a common phenomenon by identifying how many of the 200 firms have a vacillating succession pattern. The more the number of firms having the vacillating pattern in CEO succession, the more common is the phenomenon. Next, because by chance some organizations will show a vacillating pattern, the observation of leadership vacillation in a number of organizations is not sufficient if we want to know whether the phenomenon is non-random. Thus, the study employs the Pearson's Chi-square test to statistically evaluate whether the vacillating pattern is the result of deliberate choices or that of a random process. In particular, the study assesses whether the null hypothesis—leadership vacillation is the result of a random process—can be rejected. The idea of the test is to statistically appraise whether the *observed number* of firms having leadership vacillation is significantly greater than the *expected number* under a random process. If true, the test will reject the null hypothesis, providing evidence that the underlying data generating process is significantly different from a random distribution. Namely,

$$\chi^2 = \sum_{i=1}^n \frac{(O_i - E_i)^2}{E_i}, \text{ where } O_i = \text{the observed number (frequency) for bin } i; E_i = \text{the expected number (or theoretical frequency) for bin } i, \text{ asserted by the null hypothesis; here } i=1;$$

Results

Descriptive Statistics

The number of CEOs in each of the ten functional backgrounds is shown in Table 4, which also shows how the ten backgrounds are assigned to either output or throughput functions. In total, 300 leaders are of output functions, while 269 leaders are of throughput functions (Table 4). The

ratio of output leaders to throughput ones are approximately 10: 9 (i.e. 300: 269). Moreover, the sample includes 369 CEO succession events because there are 200 incumbents in the 200 companies. A summary of the data shows that out of the 369 succession events, 219 experienced changes in leader type ($\Delta TYPE = 1$) and the rest 150 have no change ($\Delta TYPE = 0$). In addition, out of the 200 firms, 117 (or 58.5%) had at least two successive CEOs with different functional origins. A correlation test shows a significant and negative relationship between a predecessor's and a successor's leader type. The results are consistent with Hypothesis 1a and suggest that the partial form of leadership vacillation exists (Table 5).

Table 4. CEO Functional Backgrounds, Number of CEOs, and Output Indicator.

	Functional Backgrounds	Number of CEOs	Output Indicator
1	Consulting/ Strategic Planning	39	1
2	Founder/Entrepreneur	33	1
3	Sales and Marketing	120	1
4	Product R&D and Technology	49	1
5	General Management	59	1
6	Process Engineering	42	0
7	Finance and Accounting	116	0
8	Production and Operation	73	0
9	Law and General Counsel	31	0
10	Others such as HR and IR	7	0
		569	

Table 5. Correlation Between Leader Types of Two Successive CEOs.
(standard errors in parentheses under coefficients)

	Successor's Leader Type	Predecessor's Leader Type
Successor's Leader Type	1	
Predecessor's Leader Type	-0.1856* (-0.0003)	1

Unlike assessing the partial form, examining the full form of leadership vacillation requires data for companies that have at least three CEOs. My sample contains 75 companies that have only two CEOs (see the result of Table 2), and hence information about these 75 firms is not utilized when testing Hypothesis 1b. In addition, there are $2^3 = 8$ permutations for patterns involving three leaders, and two out of the eight patterns are defined as leadership vacillation (Table 6). A further examination of the data indicates that out of the 125 companies that have three or more CEOs, 46 display leadership vacillation. Comparing 46 with the number of firms showing the other six succession patterns, the study finds that the firms exhibiting the vacillating pattern outnumber those having other succession patterns (Table 6). In other words, O-T-O and T-O-T are the two most common ones in the eight permutations of succession patterns, where O represents output leaders and T throughput ones. The result indicates that leadership vacillation is a common phenomenon rather than just a single case of PepsiCo's CEO succession (Figure 7a and 7b). Nevertheless, as discussed previously in the Method section, it is *not* sufficient to prove the phenomenon's existence by merely showing that it is common; we must show that leadership vacillation also is a non-random phenomenon.

Table 6. Frequency of the Eight Succession Patterns (Patterns with * are Leadership Vacillation).

(2³) = 8 Patterns	Number of Firms
O-T-O*	24*
T-O-T*	22*
O-O-T	18
O-T-T	17
O-O-O	13
T-T-O	12
T-O-O	10
T-T-T	9

Chi-Square Test

The study conducts the Chi-square—goodness-of-fit—test to evaluate the null hypothesis that leadership vacillation is just the product of a random process. An analysis of the data shows that out of the 125 firms that have three or more leaders during the sample period, 24 (or 19%) exhibit O-T-O and 22 (or 17%) display T-O-T. In contrast, if succession decisions follow the random walk, the odds that an output leader (or a throughput one) is chosen is 50: 50, and the expected probability of witnessing leadership vacillation should be 1 out of 2³, which is 12.5%. The test generates χ^2 statistic, $\chi_{(1)}^2 = 8.7$, that is significantly higher than the critical value, which equals 3.84 at p-value=0.05, thus indicating that the observed probability is significantly higher than that expected. Accordingly, the result rejects the null hypothesis and hence provides statistical evidence supporting the existence of leadership vacillation (Figure 8a and 8b). In summary, combining the findings of the descriptive statistics and the result of the goodness-of-fit test, the study finds empirical supports for the existence of a full form of leadership vacillation, suggesting that a common and non-random pattern may exist in CEO succession (Hypothesis 1b).

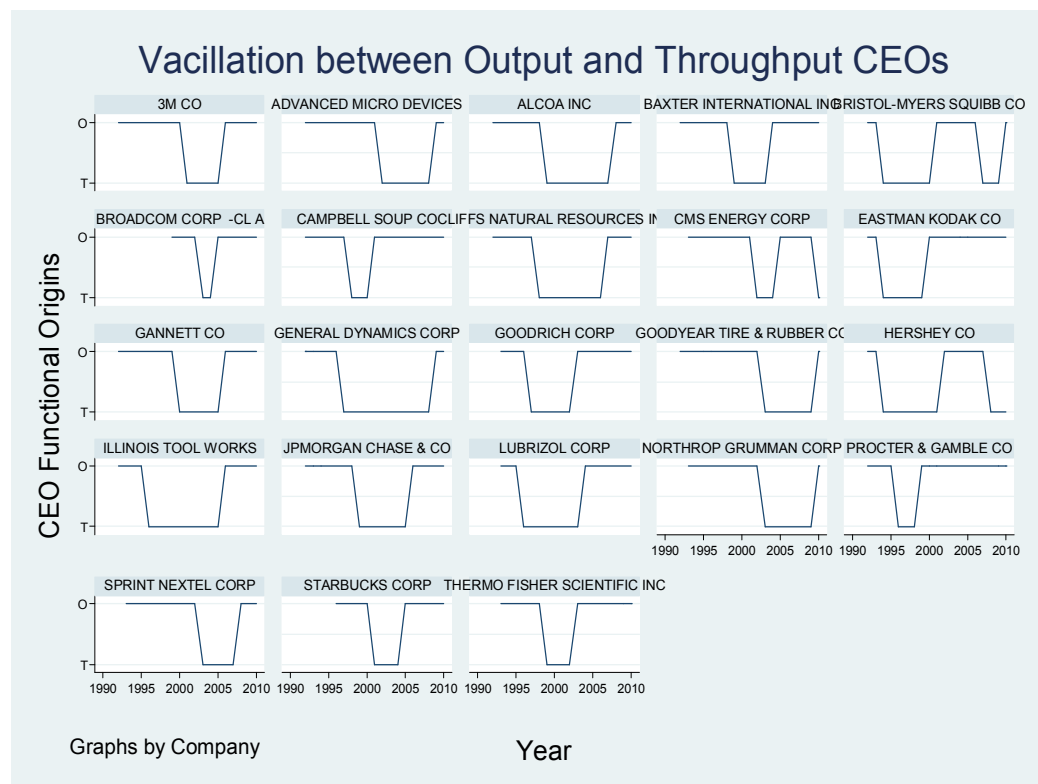


Figure 7a. Organizations with the Pattern of Output-Throughput-Output.

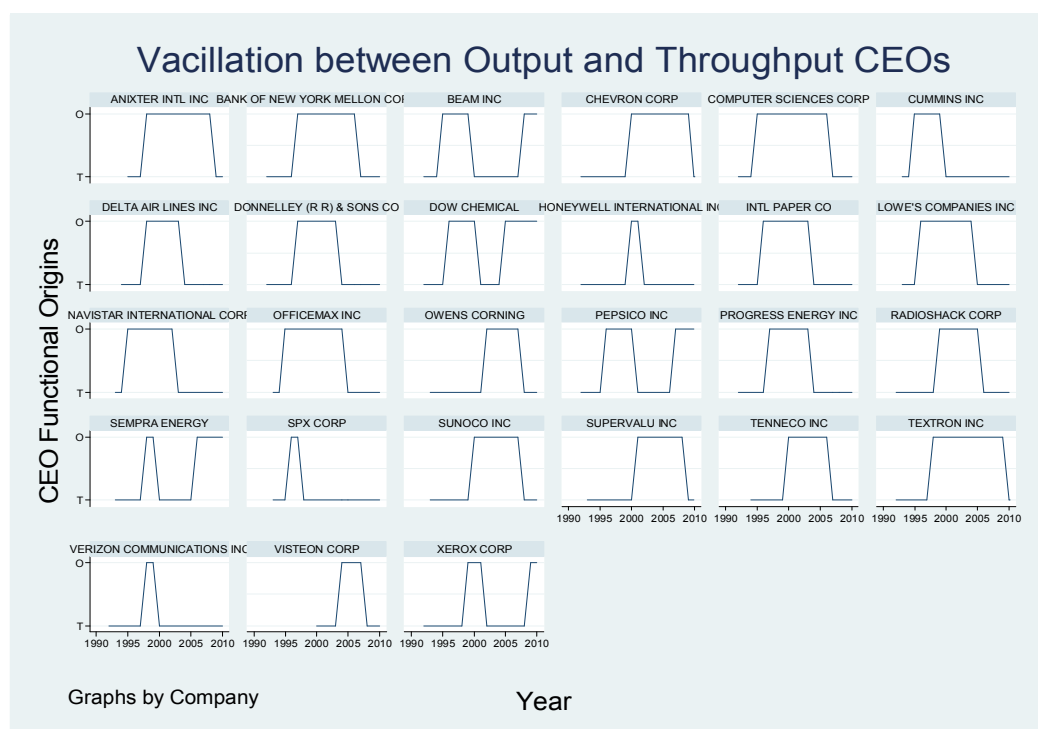


Figure 7b. Organizations with the Pattern of Throughput-Output-Throughput

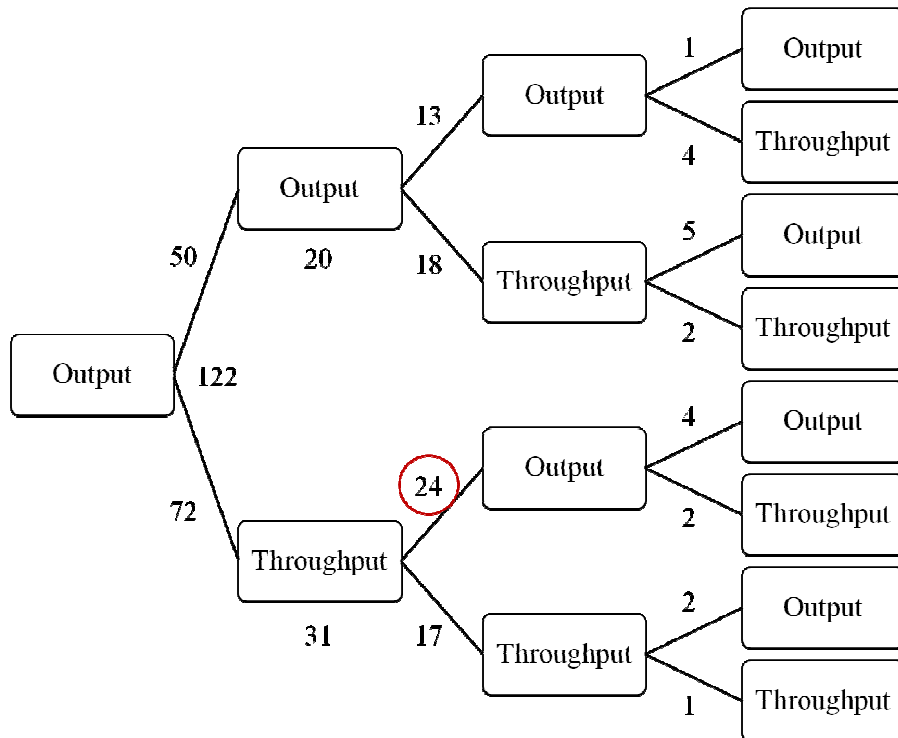


Figure 8a. The Vacillating Pattern of O-T-O.

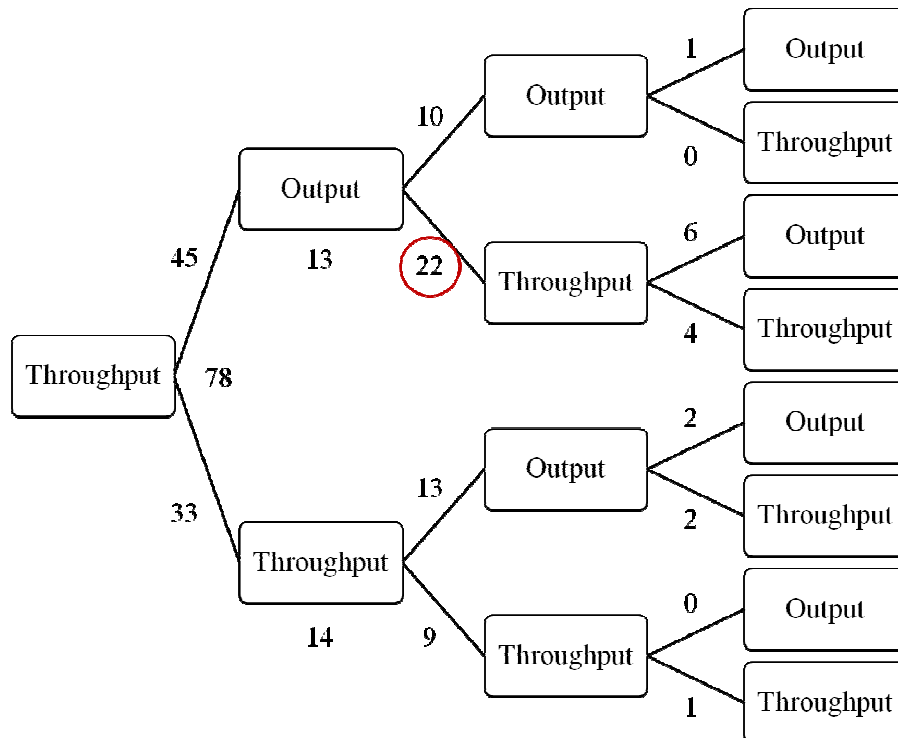


Figure 8b. The Vacillating Pattern of T-O-T.

Robustness Tests

Robustness concerns emerge because the measure of leadership vacillation depends on a categorization of functional backgrounds: output versus throughput functions. To show the existence of the phenomenon, the dissertation conducts three robustness checks by examining different categorizations of functional backgrounds. First, a categorization of CEO's secondary functional backgrounds. Second, simulations of random categorizations, and third, a categorization assigning functional backgrounds into three types: generalist, output specialist, and throughput specialist.

A robustness check utilizing a CEO's secondary functional background is necessary because the notion of leadership vacillation may become ambiguous if some leaders had worked in multiple functional areas that cover both output and throughput functions. To address the issue, the study replaces the primary functions with the secondary ones for leaders who have multiple backgrounds.³³ The new result shows that 38 companies exhibit leadership vacillation: 23 (18%) exhibit O-T-O, and 15 (12%) display T-O-T. The Chi-square test finds that the pattern of O-T-O is non-random because 18% is significantly greater than 12.5% but that the pattern of T-O-T may be random because 12% is not significantly different from 12.5%. That said, when testing both patterns in combination, the study finds that 30% (38/125) is significantly greater than the baseline value of 25% (or 31 firms)³⁴ and again rejects the null hypothesis. The robustness check suggests a conclusion that the phenomenon of leadership vacillation is non-random and common even if one considers some leaders' secondary functional backgrounds.

³³ The primary and the secondary functions are defined in the Measures section.

³⁴ Two patterns of vacillation account for 25% (i.e., 2 x 12.5%) or 31 firms (125 x 25%).

The dissertation also utilizes a Monte Carlo simulation method to randomly assign the ten functional backgrounds into either output or throughput functions. The second robustness check that involves simulations of random categorizations aims to show that leadership vacillation would only emerge when researchers assign the functional backgrounds into leader types based on the theory. The bottom line is that random categorizations should not result in the phenomenon of leadership vacillation, which is what I found in the simulations. The results of 250 simulations show that 30 firms (or 24%) is *not* significantly different from the baseline value of 31 firms (or 25%), so the result cannot reject the null hypothesis that the pattern of vacillation is due to random distribution (Table 7-8). Not rejecting the null hypothesis means that if functional backgrounds were randomly assigned to output and throughput functions, the phenomenon of leadership vacillation is no longer a product of deliberate choice but that of a random process. That is, randomly assigning functional backgrounds into two groups will not generate a non-random phenomenon such as leadership vacillation found in the dissertation.

Table 7. Descriptive Statistics of the Result of Simulations.

Variable	Simulations	Mean	Std. Dev.	Min	Max
<i>Vacillation</i>	250	29.73	7.31	8	44

Table 8. T Test (Simulations Result Versus Baseline Value).

mean = mean(vacillation)		$t = -1.75$
Ho: mean = 31		degree of freedom = 249
Ha: mean < 31	Ha: mean != 31	Ha: mean > 31
Pr(T < t) = 0.0414	Pr(T > t) = 0.0828	Pr(T > t) = 0.9586

The last robustness check deals with an alternative categorization of CEO functional background. Namely, Consulting/ Strategic Planning (#1), Founder/Entrepreneur (#2), and General Management (#5) are categorized as generalist functions because these functional areas may arguably require both output and throughput expertise.³⁵ Consequently, the purpose of the robustness check is to assess whether a pattern of vacillation can still be found if one categorizes functional backgrounds into three leader types: generalist (g), output (s_1) and throughput (s_2) specialists (Table 9).³⁶ The result suggests that a pattern of vacillation—not leadership vacillation defined previously but a pattern of vacillation among the three leader types—also is more likely than a pattern with the same leader types. Specifically, when an incumbent CEO is a generalist, it is more likely that a successor of either output or throughput will be chosen (Figure 9a). When an incumbent is an output specialist, his or her successor is more likely to be either a generalist or a throughput specialist (Figure 9b). Similarly, when an incumbent is an throughput specialist, his or her successor is more likely to be either a generalist or a throughput specialist (Figure 9c). Although few exceptions are found in Figure 9b between CEO₂ and CEO₃, overall the tendency of vacillation among the three types is clear.

³⁵ Using data from Stanford MBA alumni, Lazear (2005) examined entrepreneurs and their working experience and found that entrepreneurs are likely to be jacks-of-all-trades who varied work and educational backgrounds. Similarly, consultants and general managers may need to be generalists due to their work requirement.

³⁶ The results exclude functions 9 and 10 in Table 4. Including both functions does not change the qualitative result.

Table 9. CEO Functional Backgrounds, Number of CEOs, and Indicator.

	Functional Backgrounds	Number of CEOs	Indicator
1	Consulting/ Strategic Planning	39	g
2	Founder/Entrepreneur	33	g
3	Sales and Marketing	120	s ₁
4	Product R&D and Technology	49	s ₁
5	General Management	59	g
6	Process Engineering	42	s ₂
7	Finance and Accounting	116	s ₂
8	Production and Operation	73	s ₂
		531	

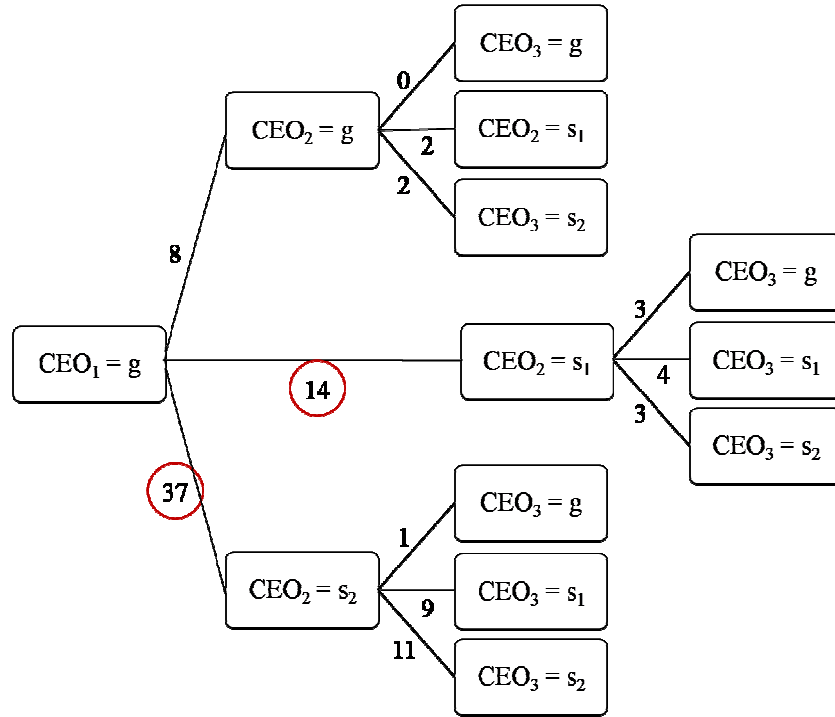


Figure 9a. Patterns Involving Generalist and Two Specialists (CEO₁ = Generalist)

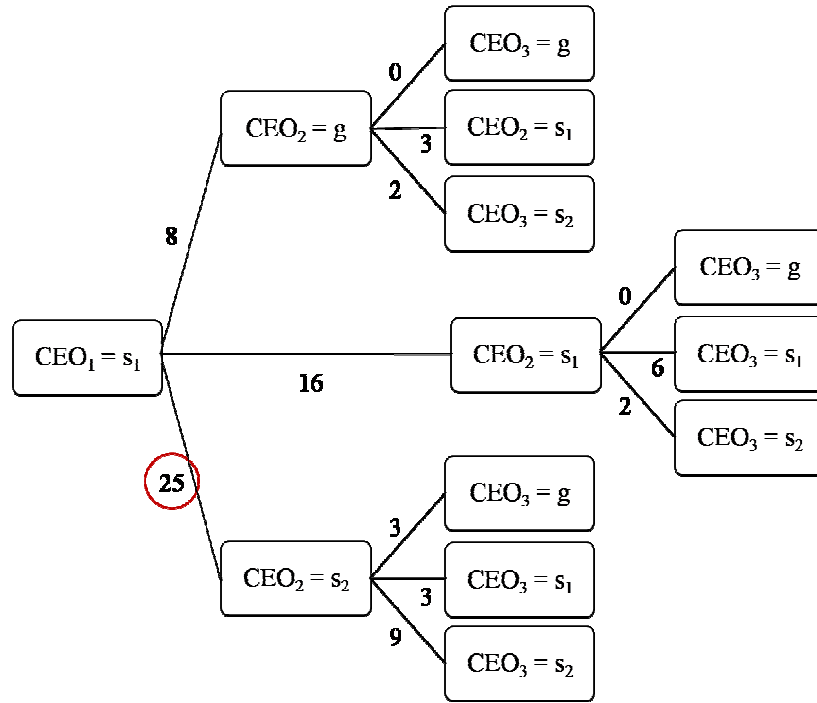


Figure 9b. Patterns Involving Generalist and Two Specialists (CEO₁ = Output)

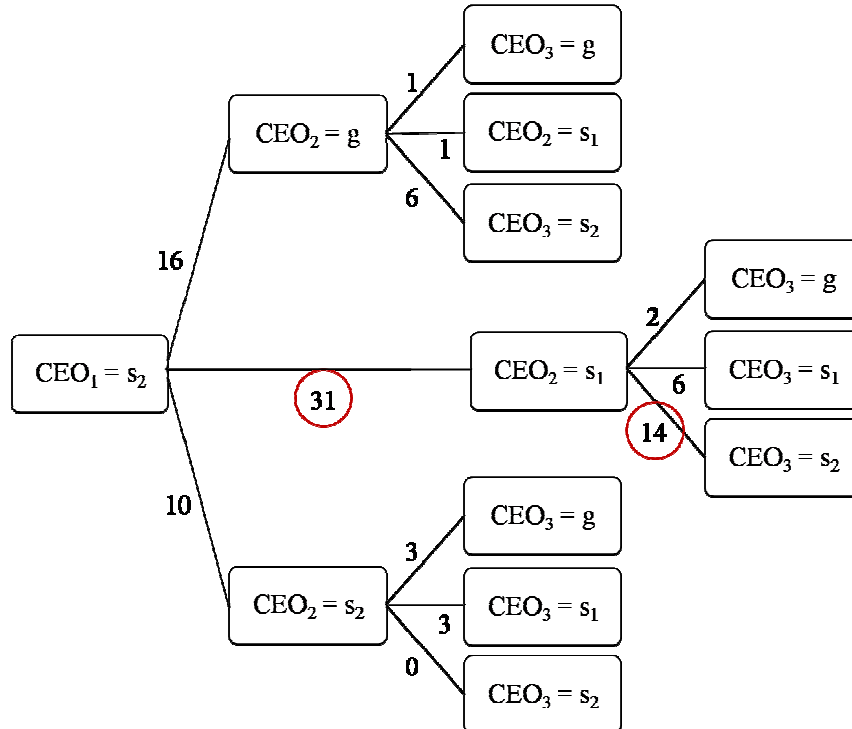


Figure 9c. Patterns Involving Generalist and Two Specialists (CEO₁ = Throughput)

Chapter VI: Antecedents and Boundary Conditions of Leadership Vacillation: A Bivariate Probit Model with Sample Selection

Introduction

After examining and establishing the existence of leadership vacillation, two questions emerge: What factors are likely to cause leadership vacillation to emerge? Under what conditions is the phenomenon likely, or unlikely, to occur? The answer to the former question is concerning *antecedents* that work when the proposed theory holds, while the answer to the latter one is about *boundary conditions* that identify when the theory would hold. Although the two questions are theoretically distinct, both explore the likelihood of leadership vacillation and can be examined in the same empirical model.

This chapter thus examines both the antecedents (Hypothesis 2) and boundary conditions (Hypothesis 3) in a bivariate probit model that accounts for sample selection because the endogeneity problem of sample selection occurs when assessing the likelihood of leadership vacillation. After correcting for the sample selection, the study finds that at first the tenure of the CEO has positive impact on a firm's probability of changing leader type, as predicted in Hypothesis 2. However, the relationship between CEO tenure and the likelihood of leadership vacillation becomes negative if the leader's tenure is over 20 years.³⁷ The finding suggests that a non-linear relationship exists, rather than a monotonic, positive relationship. I provide some explanations about the non-linearity later in the chapter. Moreover, the empirical results do not find statistical significance for the direct measures of a firm's performance (e.g., stock prices) as an antecedent of leadership vacillation. That said, the findings show that two indirect measures—an indicator variable of whether or not a departing CEO remains as the *board chair* and a binary

³⁷ The reflection point is about 20.2 years. See the results in Chapter VI for details.

variable of *exogenous turnover*—have significant impacts on a firm’s probability of changing leader type. The results provide some support for the proposed theory and the dynamic system of leadership vacillation. For Hypothesis 3, I find that a board’s capacity and its motivation to change leader type are two boundary conditions of leadership vacillation. In general, the stronger a board’s independence from CEO (Hypothesis 3a) and the larger the amount that a firm’s aspiration level exceeds its realized performance (Hypothesis 3b), the higher the likelihood of changes in leader type.

Issue of Estimation

The analysis of the antecedents and boundary conditions must address an endogeneity problem of sample selection (Figure 10). Sample selection arises because the dependent variable—changes in leader type ($\Delta TYPE = 1$)—is observed if and only if organizations experience CEO turnover ($\Delta CEO = 1$). ΔCEO equals one if the top leader’s position was taken by two different persons in two consecutive years, and 0 otherwise. Empirically speaking, conditional on $\Delta CEO = 1$, $\Delta TYPE$ is defined and measured; otherwise no observation or meaningful definition of $\Delta TYPE$ exists. In other words, the sample or the dependent variable ($\Delta TYPE$) is selectively observed based on a selection criterion (i.e., CEO turnover equation). Therefore, the study must account for the endogeneity problem of sample selection (Heckman, 1974; Maddala, 1983).

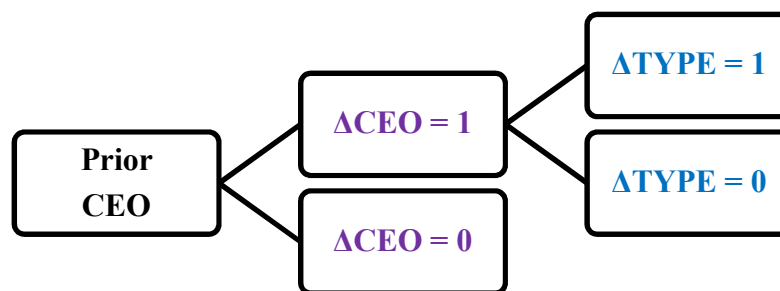


Figure 10. Endogeneity Problem of Sample Selection (e.g., Maddala, 1986).

Sample and Data Sources

The sample and data sources include the ones used to test the existence of leadership vacillation. 200 firms are randomly selected from the list of 2011 Fortune 500 Companies. The data are collected for these firms in the period of 1992 to 2011. There are 569 CEOs identified during the twenty-year period and therefore 369 CEO succession events are identified in the 200 companies. In addition, variables relating to the two sets of boundary conditions are of two sources, respectively. The board of directors data from 1996 to 2011 are retrieved from the *RiskMetrics* database, while those data from 1992 to 1995 are manually coded from each company's historical annual reports or proxy statements collected by both the SEC's *EDGAR* and the ProQuest's *Historical Annual Report* databases. The data relating to a firm's competitive aspirations—an industry's four-firm concentration ratio—are coded from the United States Census of Bureau.³⁸ Other variables about a firm's historical aspirations—its past returns—are collected from the *Compustat* database.

Measures

Dependent Variables and Exclusion Restrictions

Changes in Leader Type ($\Delta TYPE$). The same as the dependent variable used in testing the partial form of leadership vacillation (Hypothesis 1a), $\Delta TYPE$ measures changes in leader type between two successive CEOs. $\Delta TYPE$ is coded as 1 if the functional background of a new leader differs from that of a departing CEO. That is, $\Delta TYPE = 1$ when either the pattern of O-T or that of T-O occurs but $\Delta TYPE = 0$ when the patterns of O-O and T-T are observed.

CEO Turnover (ΔCEO). It is straightforward to measure CEO turnover, ΔCEO , which is coded

³⁸ United States Census of Bureau: <http://www.census.gov/econ/concentration.html>

as 1 if the top leader's position was taken by two different persons in two consecutive years (year t and $t-1$), and 0 otherwise. ΔCEO is the dependent variable used in the selection equation for the bivariate probit model.

Exclusion Restrictions. Two exclusion retractions are adopted: CEO stockholding (*ceo_holding*) and CEO age (*ceoage*) (Cannella and Shen, 2001; Zajac and Westphal, 1996). The two are used as instruments for identifying the sample selection model. The rationale for adopting the two exclusion restrictions is that they are closely related to the selection of CEO turnover (ΔCEO) but are not associated with the outcome of changes in leader type ($\Delta TYPE$). Namely, the larger the proportion of CEO stockholding and a CEO's age, the lower the likelihood of CEO turnover; however, they are theoretically independent of whether the board of director would select a new CEO with different leader type. The departing CEO's stockholding is measured as a percentage of the firm's total outstanding stock, and the CEO's age is coded from the database.

Independent Variables: Antecedents

Antecedents of Leadership Vacillation. (1) A departing CEO's tenure (*ceo_tenure*) is a continuous variable computed by the difference between "the date the CEO took the helm" and "the date the CEO left the office." A square term of the tenure (*sq_tenure*) is adopted to examine the non-linear relationship between CEO tenure and the likelihood of vacillation (2) A binary variable, *d_chairman*, equals 1 if a departing CEO remains as the chairman of the board longer than one year³⁹ after his or her turnover, and 0 otherwise. (3) An indicator variable, *d_exogen*, measures a departing CEO's unexpected and exogenous leave, which includes death and illness of the leader and the leader's unexpectedly pursuing better positions. Death, illness, or pursuing better positions are likely to be an exogenous event (to the board) and thus are unlikely to affect

³⁹ I also use two years for the robustness test; the coefficient magnitude, direction, and statistical significance change little.

the firm's existing strategic direction. The variable *d_exogen* equals 1 if a predecessor leaves the office because of death, illness, or other career opportunity and 0 otherwise. For example, Carlos Gutierrez became Kellogg's CEO at 1999, but he was chosen by President George W. Bush to be the Secretary of Commerce on November 2004. The departure of CEO Gutierrez is coded as *d_exogen* = 1. The variable is expected to be negatively correlated with the probability of $\Delta TYPE$.

(4) Finally, a dummy variable, *d_outsider*, equals 1 if the leader entered the focal company within two years of becoming CEO, and 0 otherwise. I assume that a new leader requires at least two years to familiarize colleagues, formal and informal structures, and organizational culture of the focal firm. Another measure of outsider—one year before assuming the office—is also employed for the robustness test.

Pre-Succession Stock Performance (*pre-succession performance*). To predict changes in leader type as well as CEO turnover, the study includes six pre-succession performance measures as explanatory variables: return on the S&P 500 index (*rtn_sp500*), industry performance (*rtn_ind*), industry-adjusted firm performance (*rtn_frm*), and three corresponding lagged terms. Following Kaplan and Minton (2012), *rtn_sp500* is measured as the annual return on the S&P 500 index. The variable *rtn_ind* is measured at the two-digit SIC code and equals the difference between the return on the median firm in the two-digit SIC industry and the return on the S&P 500 index. Moreover, industry-adjusted firm performance, *rtn_frm*, equals to the firm stock return minus the return for the median firm in the same two-digit SIC code (Kaplan and Minton, 2012). Finally, the three lagged stock returns are measured over the previous year: *lag_rtn_sp500*, *lag_rtn_ind*, and *lag_rtn_frm* (Kaplan and Minton, 2012) (see Table 3).

Independent Variables: Boundary Conditions

A Board's Capacity to Change Leader Type (Board Independence from CEO). Four variables are employed to measure a board's independence from a CEO. (1) The size of the board (*b_size*), which is the number of directors in a given year. (2) The average tenure of the directors (*mean_dir tenure*) is calculated by the mean of the tenures of all directors excluding the CEO. (3) The proportion of insider director (*p_insider*) is calculated by the number of directors who are employees of the focal company divided by the size of the board. (4) Similarly, the proportion of independent director (*p_independent*) is the ratio between the number of independent directors and the size of the board. The values of the latter two variables are between zero and one.

A Board's Motivation to Change Leader Type (Competitive and Historical Aspirations). (1) Competitive intensity is measured by the four-firm concentration ratio (*concentration4*), which is measured by the sales of the four largest companies divided by the sales of the industry within which the focal firm competes. While the industry is defined most by the four-digit SIC codes before 1996 and by the six-digit NAICS codes after 1997. Note that the Census Bureau conducted the survey every five years so that the variable contains less information than other variables that are collected annually. (2) Relative market share of the firm (*rel_mks*) is calculated by the ratio of a focal firm market share to that of the market leader. (3) the amount of decreasing returns (*hist_roa*) is measured by a company's past three year's average returns on assets (ROA) minus its current ROA. This variable is similar to a negative scale used in a survey item, which is positive if a company's return decreases and negative if its return increases. (4) Likewise, the frequency of decreasing returns (*trend_roa*) is calculated by the *number* of years when the firm's performance decreases. For example, if $ROA_t - ROA_{t-1} < 0$, $ROA_{t-1} - ROA_{t-2} < 0$, and $ROA_{t-2} -$

$ROA_{t-3} < 0$, the value of *trend_roa* is equal to three because there are three consecutive performance decreases. However, whenever the performance increases, the value of *trend_roa* is reset to zero. Namely, if $ROA_t - ROA_{t-1} > 0$, $ROA_{t-1} - ROA_{t-2} < 0$, and $ROA_{t-2} - ROA_{t-3} < 0$, the value of *trend_roa* is equal to zero because the most recent year has no performance decrease. Therefore, the larger the number of *trend_roa*, the more frequent a firm suffers decreasing return on assets (also see Table 3 for the List of Variables).

Method: A Bivariate Probit Model with Sample Selection

To assess the antecedents and boundary conditions, the study utilizes the phenomenon's partial form: changes in leader type ($\Delta TYPE$). The rationale is that the full form is measured as a series of *two* consecutive changes in leader type, entailing an uncertain period of time, rather than a given time point. Thus, it is empirically difficult to pinpoint and analyze the full form's antecedents and boundary conditions. To simplify and make feasible the analysis, the study takes *the pair of two successive CEOs* as the unit of analysis and assesses the phenomenon's partial form for exploratory research on leadership vacillation, instead of the full form examined in the previous chapter. In addition, the adoption of the unit of analysis enhances the understanding of leadership vacillation because *changes in leader type* (i.e., O-T or T-O) are a necessary condition for the vacillating patterns (i.e., O-T-O or T-O-T). As a result, the empirical model is designed to examine changes in leader type between two successive CEOs ($\Delta TYPE$).

The standard solution for correcting for the sample selection bias is to adopt the Heckman's two-step procedure (Heckman, 1974; 1979). However, complexity arises in analyzing $\Delta TYPE$ because it is a binary variable instead of a continuous one as in the original Heckman selection model. Therefore, the normal two-step correction procedure cannot be used, but a Maximum Likelihood Estimation (MLE) method should be employed instead (Heckman,

1979; Freedman and Sekhon, 2010). The model is therefore an application of the “sequential decision model” proposed by Maddala (1983; 1986). Specifically, this chapter conducts a “bivariate probit model with sample selection” to evaluate the antecedents and boundary conditions of leadership vacillation (Hypotheses 2-3).

The model is an equivalent of Heckman’s selection model except now a probit model, instead of an OLS model, is used in the outcome equation. The model is somewhere between a bivariate probit model and a bivariate probit model with partial observability. In other words, one observes more than in the partial observability model but less than in the full bivariate probit model. For example, one observes x_i , y_{i1} and $z_i = y_{i1} * y_{i2}$. Moreover, one observes y_2 if and only if $y_1 = 1$ because if $y_{i1} = 1$, then $y_{i2} = z_i$ and z_i is observed. However, if $y_{i1} = 0$, then we have no information about y_{i2} . In this study, y_2 is $\Delta TYPE$ and y_1 is ΔCEO . Thus, the probit equation of CEO turnover (the selection equation) is completely observed, but only a selected (censored) sample of $\Delta TYPE$ (the outcome equation) is observed. Note that there are four possible outcomes for the pair of (y_{i1}, y_{i2}) : $(y_{i1} = 1, y_{i2} = 1)$, $(y_{i1} = 1, y_{i2} = 0)$, $(y_{i1} = 0, y_{i2} = 1)$, and $(y_{i1} = 0, y_{i2} = 0)$. The first two can be observed, while the last two cannot be observed and thus are indistinguishable (Berinsky, 2004).⁴⁰

There are three types of observations in a sample with the following probabilities.

- (1) $y_1 = 0$; $Pr(y_1 = 0) = \Phi(-x_1\beta_1)$ [$\Delta CEO = 0$, no value for $\Delta TYPE$]
- (2) $y_1 = 1; y_2 = 0$; $Pr(y_1 = 1, y_2 = 0) = \Phi(x_1\beta_1) - \Phi_2(x_1\beta_1, x_2\beta_2, \rho)$ [$\Delta CEO = 1$ but $\Delta TYPE = 0$]
- (3) $y_1 = 1; y_2 = 1$; $Pr(y_1 = 1, y_2 = 1) = \Phi_2(x_1\beta_1, x_2\beta_2, \rho)$ [$\Delta CEO = 1$, and $\Delta TYPE = 1$]

⁴⁰ Berinsky (2004) has used the same model to evaluate people’s attitudes towards race issues. The rationale is that he only observed race attitudes for people who were willing to answer the survey question in the first place. Thus, the selection equation (or the equation for y_{i1}) is whether a respondent answers the question and the second probit model—an outcome equation—is their dichotomous attitude towards race issues (Berinsky, 2004: 146).

(1) ($y_{li} = 0$) is a truncated observation when there is no CEO turnover so that no observations of leadership vacillation; (2) ($y_{li} = 1$ and $y_{2i} = 0$) is an untruncated observation, where there is a CEO turnover that does not involve a change in the types of the two successive leaders; (3) finally, ($y_{li} = 1$ and $y_{2i} = 1$) also is an untruncated observation, where there is a CEO turnover that involves a change in leader type. Thus the log-likelihood function is:

$$\begin{aligned}\ln L = \sum_{i=1}^N \{ & y_{i1}y_{i2} \ln \Phi_2(x_1\beta_1, x_2\beta_2, \rho) \\ & + y_{i1}(1 - y_{i2}) \ln [\Phi(x_1\beta_1) - \Phi_2(x_1\beta_1, x_2\beta_2, \rho)] \\ & + (1 - y_{i1}) \ln \Phi(-x_1\beta_1) \}\end{aligned}$$

where $\Phi_2(x_1\beta_1, x_2\beta_2, \rho)$ is the cumulative bivariate normal function defined by $x_1\beta_1$, $x_2\beta_2$, and ρ .

Accordingly, the bivariate probit model with sample selection can be written as the following two equations:

Outcome Equation (i.e., dependent variable = changes in leader type):

$$\begin{aligned}\Delta TYPE = & \beta_1 \text{ceo_tenure} + \beta_2 \text{sq_tenure} + \beta_3 \text{pre-succession performance} + \beta_4 \text{d_chairman} \\ & + \beta_5 \text{d_exogen} + \beta_6 \text{d_outsider} + \beta_7 \text{b_size} + \beta_8 \text{mean_dir tenure} + \beta_9 \text{p_indisder} \\ & + \beta_{10} \text{p_independent} + \beta_{11} \text{concentration4} + \beta_{12} \text{rel_mks} + \beta_{13} \text{hist_roa} + \beta_{14} \text{trend_roa} + \varepsilon\end{aligned}$$

where $\Delta TYPE$ is a binary variable, which equals 1 if there is a change in leader type between two consecutive CEOs and 0 otherwise; ceo_tenure is a continuous variable measuring the departing CEO's tenure, and sq_tenure is the square term of ceo_tenure (Hypotheses 2a); d_chairman equals 1 if a predecessor stays on as the chairman of the board, and 0 otherwise (Hypotheses 2b); d_exogen is equal to 1 if the reason for the turnover is death, illness or other career opportunity (Hypotheses 2b); d_outsider equals 1 if a successor is an outsider, and 0 otherwise (Hypotheses 2b); **pre-succession performance** is a vector of six stock performance measures capturing the

pre-succession performance (Hypotheses 2b).⁴¹ While the above are the proposed antecedents, the following variables are correlated to the two sets of boundary conditions: a board's capacity and motivation to change; *b_size* is the number of directors in the board.

Selection Equation (i.e., dependent variable = CEO turnover):

$$\begin{aligned} \Delta CEO = & \eta_1 \text{ceo_holding} + \eta_2 \text{ceoage} + \gamma_1 \text{ceo_tenure} + \gamma_2 \text{sq_tenure} + \gamma_3 \text{pre-succession} \\ & \text{performance} + \gamma_4 \text{d_chairman} + \gamma_5 \text{d_exogen} + \gamma_6 \text{d_outsider} + \gamma_7 \text{b_size} + \gamma_8 \text{mean_dir tenure} \\ & + \gamma_9 \text{p_indisder} + \gamma_{10} \text{p_independent} + \gamma_{11} \text{concentration4} + \gamma_{12} \text{rel_mks} + \gamma_{13} \text{hist_roa} \\ & + \gamma_{14} \text{trend_roa} + \varepsilon \end{aligned}$$

where ΔCEO is a binary variable that equals 1 if there is a CEO succession event, and 0 otherwise. The two exclusion restrictions (or instruments) enabling the model identification are *ceo_holding* and *ceoage* because the two variables are associated with ΔCEO but are unrelated with $\Delta TYPE$.⁴² I use η 's instead of β 's to distinguish the coefficients of the exclusion restrictions from those of the other explanatory variables that also appear in the outcome equation. Thus, other than the two exclusion restrictions, the two equations contain the same explanatory variables, satisfying the requirement of the identification of Heckman selection model, including the bivariate probit model with sample selection.

Results

Descriptive Statistics

Means, standard deviations, and correlations for variables used in the bivariate probit model with sample selection are presented in Table 10. The results of Hypotheses 2 and 3 are shown in Table 11. Model 1 contains only antecedent variables in the outcome and selection equations. Model 2 and Model 3 additionally contain boundary conditions of the board control and its aspiration

⁴¹ The measures include *rtn_sp500*, *rtn_ind*, *rtn_frm*, and the three corresponding lagged variables.

⁴² Also see the *Results* section for further empirical confirmation of the validity of the two exclusion restrictions.

level, respectively. Model 4 is the full model containing antecedents and the two sets of boundary conditions. Additionally, for the reference, Models 5 presents a bivariate probit model without correcting for sample selection, while Model 6 shows the selection equation of ΔCEO .

Bivariate Probit Model with Sample Selection

In Model 1 and the full model, the coefficient of *ceo_tenure*, β_1 , is significantly positive but the coefficient of *sq_tenure*, β_2 , is significantly negative, indicating a non-linear relationship between a departing leader's tenure and the probability of changes in leader type. The longer the tenure of a departing CEO, the higher the likelihood of changes in leader type. However, after a CEO's tenure is over 20 years, the likelihood of $\Delta TYPE$ is in fact decreasing. In specific, the reflection point was found to be 20.2 years. Although there were few CEOs (i.e., 24 out of the 369 departed CEOs) holding the position for so long, the result is partially consistent with Hypothesis 2a. Moreover, the finding of the non-linear relationship indicates that there may be some leaders that can master both strategies of exploration and exploitation. For those leaders, their tenures are long enough to complete a cycle of strategy vacillation. Equally important, those leaders must be few in numbers, approximately 6.4% in my sample. The finding suggests that the assumption (A3) holds for most of the leaders.

The non-linearity implies that if a CEO stays in the office for a very long time, it is likely that the company does not face changes in the nature of strategic challenges or it has a capable CEO that is ambidextrous enough to implement both exploration and exploitation strategies in sequence. For example, GE's Jack Welch was in the office for more than 20 years and his successor, Jeffrey Immelt, is an output leader just like Welch himself. It is likely that Welch managed to complete a dynamic balance during his tenure so that his successor did not have to be a different type of leader.

Table 10. Means, Standard Deviations, and Correlations.

	Variable	Obs.	Mean	Std. Dev.	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
(1)	<i>ΔTYPE</i>	369	0.593	0.492	1								
(2)	<i>ceo_tenure</i>	3893	6.877	6.323	0.088	1							
(3)	<i>sq_tenure</i>	3893	87.257	191.874	0.024	0.932	1						
(4)	<i>d_chairman</i>	3893	0.011	0.102	-0.153	0.169	0.133	1					
(5)	<i>d_exogen</i>	3893	0.009	0.094	-0.270	-0.098	-0.020	-0.114	1				
(6)	<i>d_outsider</i>	3893	0.025	0.157	0.091	-0.073	-0.016	-0.027	-0.013	1			
(7)	<i>rtn_snp500</i>	3893	0.077	0.183	0.076	0.093	0.091	-0.046	0.033	-0.023	1		
(8)	<i>rtn_ind</i>	3882	-0.036	0.293	-0.069	-0.047	-0.039	-0.059	0.005	0.055	-0.599	1	
(9)	<i>rtn_frm</i>	3675	0.110	0.317	0.028	0.131	0.065	0.171	-0.051	-0.159	-0.057	-0.118	1
(10)	<i>lag_rtn_snp500</i>	3693	0.074	0.187	0.026	0.053	0.057	0.013	0.002	-0.089	0.181	0.385	0.032
(11)	<i>lag_rtn_ind</i>	3682	-0.028	0.298	-0.030	0.017	0.020	-0.034	0.013	0.032	-0.137	-0.288	0.008
(12)	<i>lag_rtn_frm</i>	3676	0.112	0.320	-0.102	0.012	-0.011	0.091	0.070	-0.166	0.044	-0.046	0.175
(13)	<i>ceoage</i>	3889	56.878	6.340	0.063	0.406	0.391	-0.005	-0.112	-0.245	0.059	0.010	0.042
(14)	<i>ceo_holding</i>	3605	0.011	0.045	-0.106	0.252	0.253	0.188	-0.049	0.005	-0.044	0.038	0.107
(15)	<i>b_size</i>	3798	11.364	2.560	0.106	0.021	0.002	-0.092	-0.062	-0.117	0.083	0.013	0.038
(16)	<i>mean_dirtenure</i>	3799	-7.823	3.360	0.053	-0.390	-0.371	-0.103	0.093	0.123	0.036	0.067	-0.078
(17)	<i>p_insider</i>	3797	0.168	0.104	-0.006	0.095	0.122	0.114	-0.034	-0.088	0.066	-0.153	0.074
(18)	<i>p_independent</i>	3797	0.727	0.167	0.062	-0.145	-0.161	-0.083	0.031	0.111	-0.156	0.150	-0.036
(19)	<i>concentration4</i>	3711	0.435	0.296	-0.041	0.026	0.060	0.022	0.040	-0.050	-0.043	0.101	0.016
(20)	<i>rel_mks</i>	3881	0.615	0.364	0.000	-0.042	-0.038	0.023	0.056	0.023	0.074	-0.042	0.007
(21)	<i>hist_roa</i>	3691	0.001	0.067	-0.006	0.009	0.012	0.026	0.045	-0.092	0.002	0.175	0.142
(22)	<i>trend_roa</i>	3690	-0.666	0.927	-0.039	-0.045	-0.053	-0.014	0.037	-0.082	0.045	0.148	0.151

Table 10. Means, Standard Deviations, and Correlations (Cont.)

	Variable	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)
(1)														
(2)														
(3)														
(4)														
(5)														
(6)														
(7)														
(8)														
(9)														
(10)	<i>lag_rtn_snp500</i>	1												
(11)	<i>lag_rtn_ind</i>	-0.650	1											
(12)	<i>lag_rtn_frm</i>	0.148	-0.264	1										
(13)	<i>ceoage</i>	0.124	0.005	-0.025	1									
(14)	<i>ceo_holding</i>	-0.017	0.098	0.034	0.099	1								
(15)	<i>b_size</i>	0.098	-0.016	-0.032	0.189	-0.180	1							
(16)	<i>mean_dir tenure</i>	0.044	-0.187	0.063	-0.138	-0.285	0.067	1						
(17)	<i>p_insider</i>	0.064	0.069	0.110	-0.011	0.174	0.004	-0.137	1					
(18)	<i>p_independent</i>	-0.127	-0.037	-0.083	-0.019	-0.267	-0.041	0.282	-0.695	1				
(19)	<i>concentration4</i>	0.050	-0.076	-0.087	0.065	-0.020	0.026	0.041	-0.082	0.076	1			
(20)	<i>rel_mks</i>	0.062	-0.103	0.046	0.018	0.045	0.088	-0.015	0.000	-0.034	0.074	1		
(21)	<i>hist_roa</i>	0.221	-0.015	0.264	0.189	0.017	0.064	-0.036	0.043	0.031	-0.052	0.058	1	
(22)	<i>trend_roa</i>	0.248	-0.073	0.268	0.005	-0.023	0.070	-0.004	0.045	-0.038	0.014	0.011	0.439	1

Table 11. The Bivariate Probit Model with Sample Selection [Dependent Variable: $\Delta TYPE$].

	Model 1: Antecedents (A)	Model 2: Capacity (A+ B1)	Model 3: Motivation (A+B2)	Model 4: Full Model (A+B1+B2)	Model 5: Outcome Equation	Model 6: Selection Equation
DV: $\Delta TYPE$						
<i>ceo_tenure</i>	0.0875*** (3.90)	0.0696* (2.03)	0.0796** (3.11)	0.0668+ (1.92)	0.0865** (2.79)	-
<i>sq_tenure</i>	-0.00197** (-3.04)	-0.00137 (-1.64)	-0.00180* (-2.48)	-0.00127+ (-1.93)	-0.00183* (-2.20)	-
<i>d_chairman</i>	-1.171*** (-4.24)	-1.488*** (-4.29)	-1.073*** (-3.61)	-1.372*** (-3.82)	-0.791** (-3.22)	-
<i>d_exogen</i>	-1.237*** (-4.85)	-1.610*** (-3.83)	-1.424*** (-4.40)	-1.775*** (-3.82)	-1.179*** (-4.29)	-
<i>d_outsider</i>	0.113 (0.66)	-0.284 (-0.88)	0.156 (0.73)	-0.206 (-0.59)	0.216 (1.32)	-
<i>rtn_snp500</i>	-0.0974 (-0.17)	0.0377 (0.06)	-0.337 (-0.55)	-0.212 (-0.33)	-0.308 (-0.51)	-
<i>rtn_ind</i>	-0.627 (-1.55)	-0.637 (-1.50)	-0.681 (-1.55)	-0.760 (-1.62)	-0.605 (-1.38)	-
<i>rtn_frm</i>	0.143 (0.59)	0.166 (0.67)	0.131 (0.53)	0.129 (0.50)	0.132 (0.55)	-
<i>lag_rtn_snp500</i>	0.653 (1.09)	0.732 (1.21)	0.445 (0.71)	0.471 (0.72)	0.358 (0.56)	-
<i>lag_rtn_ind</i>	-0.167 (-0.52)	-0.0884 (-0.28)	-0.307 (-0.87)	-0.265 (-0.74)	-0.295 (-0.88)	-
<i>lag_rtn_frm</i>	-0.250 (-1.02)	-0.322 (-1.30)	-0.307 (-1.14)	-0.451 (-1.60)	-0.432 (-1.57)	-
<i>b_size</i>	-	-0.013+ (-1.95)	-	-0.229** (-2.83)	-0.115 (-1.42)	-
<i>mean_dir tenure</i>	-	0.029 (1.18)	-	0.049+ (1.92)	0.046+ (1.93)	-
<i>p_insider</i>	-	-0.735* (-1.96)	-	-0.736* (-1.99)	-0.655 (-1.48)	-
<i>p_independent</i>	-	0.692 (1.49)	-	0.686 (1.31)	0.303 (1.01)	-
<i>concentration4</i>	-	-	-0.111* (-2.32)	-0.150* (-2.43)	-0.139 (-1.67)	-
<i>rel_mks</i>	-	-	0.090 (0.40)	0.029 (0.13)	0.104 (0.47)	-
<i>hist_roa</i>	-	-	0.690 (0.96)	0.986 (1.26)	0.721 (1.00)	-
<i>trend_roa</i>	-	-	0.028 (1.32)	0.056* (2.01)	0.029 (1.33)	-

	Model 1	Model 2	Model 3	Full Model 4	Model 5	Model 6
Selection: ΔCEO						
<i>ceo_age</i>	0.0357* (2.82)	0.0114* (2.11)	0.0304* (-2.18)	0.0139* (2.42)	-	0.0136* (2.36)
<i>ceo_holding</i>	-5.580** (-2.63)	-5.927** (-2.85)	-6.097* (-2.13)	-6.627* (-2.49)	-	-6.465* (-2.37)
<i>ceo_tenure</i>	0.108*** (6.12)	0.117*** (5.13)	0.108*** (5.56)	0.120*** (4.95)	-	0.121*** (5.03)
<i>sq_tenure</i>	-0.00180** (-3.12)	-0.00266** (-3.11)	-0.00192** (-2.94)	-0.00278** (-3.06)	-	-0.00280** (-3.14)
<i>d_chairman^a</i>	7.882*** (25.24)	8.054*** (33.03)	3240816.2 (.)	9.317*** (38.14)	-	N/A
<i>d_exogen^b</i>	7.736*** (61.57)	7.986*** (18.33)	8.354*** (8.36)	7.742*** (15.72)	-	N/A
<i>d_outsider^c</i>	8.362*** (101.21)	8.240*** (22.96)	8.422*** (112.46)	8.090*** (31.00)	-	N/A
<i>rtn_snp500</i>	-1.427** (-7.07)	-1.443** (-6.80)	-1.428** (-6.83)	-1.445** (-7.02)	-	-1.428** (-6.65)
<i>rtn_ind</i>	-0.313* (-2.02)	-0.313+ (-1.90)	-0.310+ (-1.87)	-0.316* (-2.00)	-	-0.313+ (-1.89)
<i>rtn_frm</i>	-0.664** (-8.71)	-0.666** (-10.53)	-0.664** (-2.64)	-0.663** (-8.32)	-	-0.664** (-6.94)
<i>lag_rtn_snp500</i>	-1.178** (-6.24)	-1.201** (-6.39)	-1.171** (-5.91)	-1.209** (-6.46)	-	-1.181** (-5.94)
<i>lag_rtn_ind</i>	-0.669** (-6.66)	-0.688** (-6.87)	-0.666** (-6.31)	-0.692** (-6.93)	-	-0.670** (-6.43)
<i>lag_rtn_frm</i>	-0.665** (-8.53)	-0.671** (-9.10)	-0.665** (-4.38)	-0.671** (-8.75)	-	-0.665** (-7.98)
<i>b_size</i>	-	-0.029* (-2.16)	-	-0.025 (-1.64)	-	-0.025 (-1.67)
<i>mean_dirtenure</i>	-	0.0610*** (4.52)	-	0.055*** (4.00)	-	0.055*** (3.98)
<i>p_insider</i>	-	-1.262** (-2.70)	-	-1.391** (-2.78)	-	-1.463** (-2.94)
<i>p_independent</i>	-	2.301*** (8.41)	-	2.346*** (8.06)	-	2.331*** (7.94)
<i>concentration4</i>	-	-	-0.460* (-2.56)	-0.247 (-1.53)	-	-0.248 (-1.52)
<i>rel_mks</i>	-	-	-0.170 (-1.80)	-0.105 (-1.02)	-	-0.0980 (-0.96)
<i>hist_roa</i>	-	-	-0.866 (-1.27)	-0.645 (-0.77)	-	-0.684 (-0.83)
<i>trend_roa</i>	-	-	0.017 (1.37)	0.016 (1.63)	-	0.011 (1.23)
<i>_cons</i>	-0.146* (-2.65)	-0.459+ (-1.88)	-0.110+ (-1.92)	-0.400* (-2.98)	-	-
<i>N</i>	3676	3676	3676	3676	369	3676

t statistics in parentheses. + $p < 0.1$. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. ^a, ^b, and ^c The three variables are included in the ΔCEO equation in the first four models because they are explanatory variables in $\Delta TYPE$.

One set of variables is related to pre-succession stock performance. The coefficients of performance measures, *the vector of β_3* , are *not* significant in either Model 1 or the full model. However, in the selection equation of CEO turnover, the coefficients of performance measures are significantly negative, consistent with previous research on CEO turnover (e.g., Kaplan and Minton, 2012). The results suggest that the pre-succession performance influences the decision of CEO turnover; but, conditional on ΔCEO , the pre-succession performance has no impact on $\Delta TYPE$. Hypothesis 2b is *not* supported: There is *no* significant negative relationship between a firm's pre-succession performance and the likelihood of changes in leader type when I measure the pre-succession performance by using stock prices against S&P 500 indexes. The results may be due to external factors that influence pre-succession performance, instead of the internal ones such as the levels of the two complementary activities. Because direct measures of pre-succession performance cannot solely represent how leaders accumulate the levels of exploration and exploitation activities, indirect measures such as the three proposed in the dissertation also are important for testing Hypothesis 2b.

The coefficient of $d_chairman$, β_4 , is significantly negative in Model 1 and the full Model, suggesting that when a departing CEO remains as the chairman of the board, the probability of $\Delta TYPE$ decreases by 1.5%. The calculation of the percentage decrease is by using the means for all other variables; in specific, $F(3.15) - F(2.15) = 0.015$, where F is the cumulative distribution function of the standard normal. The caveat is that the interpretation of the percentage decrease is thus conditional. In addition, the coefficient of d_exogen , β_5 , is significantly negative, implying a negative association between an exogenous CEO turnover event and the probability of changes in leader type. That is, when a departing CEO leaves the office because of illness, death, or other career concerns, which are relatively exogenous to the board of directors, the likelihood of

changes in leader type is lower by 1.6%. The calculation procedure is the same as the one used above. Moreover, the coefficient of *d_outsider*, β_6 , is *neither* robust nor significant across the various models. In Model 1 and Model 5, β_6 is positive but not significant, while in the full Model β_6 is estimated to be negative. A closer look of the data suggests that while most outsider selections (*d_outsider* = 1) lead to changes in leader type, the reverse is not true: Insider promotion also result in $\Delta TYPE$.⁴³ In general, two of the three measures relating to a firm's pre-succession performance are consistent with Hypothesis 2b, which posits a negative relationship between pre-succession performance and the likelihood of leadership vacillation. Furthermore, the findings only partially support that the pre-succession performance mediates between CEO tenure and the likelihood of changes in leader type.

Finally, η_1 and η_2 , the coefficients of *ceo_holding* and *ceoage* are significant.⁴⁴ However, when included in the outcome equation, the variables of *ceo_holding* and *ceoage* are not significant. Namely, the exclusion restrictions *ceo_holding* and *ceoage* are associated with the probability of CEO turnover but are uncorrelated with the likelihood of $\Delta TYPE$, further confirming the validity of the two instruments for model identification.

A board's capacity to change leader types is assessed in Model 2 and the full model (Hypotheses 3a). The coefficient of *b_size*, β_7 , is negative and significant. The result implies that the larger the number of board members, the higher the costs of making change due to the difficulty of collective bargaining with the CEO. That is, there is a negative relationship between a board's size and the likelihood of changes in leader type. The coefficient of *mean_dir tenure*, β_8 , is positive and significant, suggesting that the longer the tenure of board directors, the stronger

⁴³ Out of 100 outsider successions, 64 (or 64%) have different leader types from their predecessors'. But out of 269 insider successions, 156 (or 58%) have different leader types.

⁴⁴ Replacing the continuous variable of *ceoage* to a binary variable *age60* (= 1 if CEO is older than 60; 0 otherwise) that is used by Kaplan and Minton (2012) does not change the results.

the board independence from the CEO. There is a positive relationship between a board's average tenure, excluding CEO tenure, and the likelihood of changes in leader type. Finally, β_9 and β_{10} , the coefficients of $p_indisder$ and $p_independent$, are expected to have opposite effects on the likelihood of leadership vacillation. However, only β_9 is significantly negative, suggesting that there is a negative relationship between a board's proportion of insider directors and the likelihood of changes in leader type. β_{10} has a different sign but not statistically significant. Therefore, there is *no* significant positive relationship between a board's proportion of independent directors and the likelihood of changes in leader type. In total, three of the four measures used to test a board's capacity to change leader type show consistent results with Hypothesis 3a. The findings suggest that the stronger a board's independence from the CEO, the higher the likelihood of leadership vacillation.

In Model 3 and the full model the study examines a firm's motivation to change its leader types (Hypotheses 3b). β_{11} is the coefficient estimate of the variable *concentration4*, an industry's four-firm concentration ratio. β_{11} is negative and statistically significant, which is consistent with the prediction that an industry's concentration level is negatively correlated with the likelihood of changes in leader type for organizations in the industry. In addition, a firm's relative market share, *rel_mks*, also forms its competitive aspiration. However, the coefficient estimate of *rel_mks*, β_{12} , is found to be negative but *not* significant. The result does not support the prediction that there is a negative relationship between a firm's relative market share and the likelihood of changes in leader type. I conjecture that whenever the relative market share is a stable ratio, a company may get used to the ratio and lose the motivation to make changes. Therefore, to predict leadership vacillation, the relative market share ratio may be less informative than an industry's competitiveness (especially when there is no clear leader of market share).

Finally, an organization's past performance forms a historical aspiration level and thus has impact on a board's motivation to change leader type. Two notions of historical aspiration are employed—the *amount* and the *frequency* of decreasing returns—and are measured by a company's past three year's average ROA minus its current ROA (*hist_roa*) and by the *number* of years when the firm's ROA decreases (*trend_roa*), respectively. The coefficient estimates of the two variables are β_{13} and β_{14} . The results from the bivariate probit model show that β_{13} is positive but *not* significant, while β_{14} is positive and statistically significant. The results imply that the amount of decreasing returns for the past three years has less impact than the frequency of decreasing returns. Put differently, the consecutive decreases in ROA has larger effects than the amount of decreases has on a firm's motivation to change leader types. In summary, two of the four measures used to test a board's motivation to change leader type show consistent results with Hypothesis 3b. Therefore, the empirical findings are only partially consistent with the prediction that the stronger a board's motivation to change leader type, the higher the likelihood of leadership vacillation.

Model 5 and Model 6 provide comparisons to the Full Model by examining only the outcome equation and the selection equation, respectively. The results of Model 5, a probit model without correcting for sample selection, show the same directions for the key coefficient estimates. However, without correcting for the two endogeneity problems, many coefficients are not significant in Model 5, implying that the model with sample selection is more appropriate for testing the theory of leadership vacillation because $\Delta TYPE$ is conditional on $\Delta CEO = 1$.

Robustness Tests

Three robustness tests are conducted: one for the issue of multicollinearity, one for model specification, and one for controlling for the relative labor market size of the two types of leaders.

First, the study examines possible multicollinearity and calculates the variance inflation factors (VIFs). It is critical to calculate the VIF because in the presence of multicollinearity, OLS provides more robust estimates than the MLE or Heckman estimators (Puhani, 2000). The scores of the VIF associated with the explanatory variables of the probit model are no greater than 2 (i.e., the mean VIF is equal to 1.99), suggesting that multicollinearity is unlikely to be a problem in my sample (Table 12). The VIF shows how much the variance of a coefficient estimate is being inflated by multicollinearity. For example, if the VIF for a variable were 9, its standard error would be three times as large as it would be if its VIF was 1. In such a case, the coefficient would have to be 3 times as large to be statistically significant.

Table 12. Variance Inflation Factors Scores (VIF<10).

Variable	VIF	1/VIF			
<i>ceo_tenure</i>	6.49	0.1541	<i>ceoage</i>	1.3	0.7704
<i>sq_tenure</i>	6.06	0.1652	<i>ceo_holding</i>	1.27	0.7901
<i>rtn_ind</i>	3.36	0.2978	<i>mean_dirtenure</i>	1.17	0.8557
<i>lag_rtn_sp500</i>	2.63	0.3796	<i>rtn_frm</i>	1.16	0.8614
<i>rtn_snp500</i>	2.61	0.3837	<i>lag_rtn_frm</i>	1.12	0.8913
<i>p_independent</i>	2.01	0.4978	<i>b_size</i>	1.07	0.9387
<i>lag_rtn_ind</i>	1.94	0.5165	<i>d_outsider</i>	1.06	0.9448
<i>p_insider</i>	1.84	0.5450	<i>d_chairman</i>	1.04	0.9595
<i>hist_roa</i>	1.37	0.7275	<i>rel_mks</i>	1.02	0.9766
<i>trend_roa</i>	1.33	0.7514	<i>d_exogen</i>	1.02	0.9767
			<i>concentration4</i>	1.02	0.9844
Mean VIF				1.99	

Second, using a logit model rather than the probit model provides the same direction of all coefficients, which indicates that different model specifications do not alter the results. However, because the logit model cannot be used in correcting for sample selection, the alternative model specification only provides a provisional instead of a conclusive robustness test.

Finally, the concern of relative labor market size for the two types of leaders is addressed in two ways. I first compare the relative market size for output versus throughput leaders in each year (Table 13). The result shows that in the years between 1992 to 2011, the ratio of the number of output leaders to that of CEO successions was between 32% to 68%, except in the year of 2003, where the ratio is 20%. Consequently, the result implies that the relative market size for output versus throughput CEOs are stable, resulting in the stable availability of both types of leaders in each year. Even in the year 2003, there were still 5 output leaders were chosen to be CEOs, suggesting that the labor supply for output leaders did not set a strict constraint to a firm's choice of new CEOs. Second, when introducing year dummies in the probit model with sample selection, most year dummies are *not* significant. The empirical result is consistent with the notion that relative labor market size did not affect a firm's choice of changing leader type.

Combining the two analyses helps address the concern that relative labor market size for the two types of leaders lead to the phenomenon of leadership vacillation. Namely, the labor supply of the two types of leaders is less likely to be a driving force or an antecedent of leadership vacillation. The results of this chapter about antecedents and boundary conditions therefore will not be affected by some extreme distribution of output or throughput leaders.

Table 13. Relative Market Size for Output Versus Throughput Leaders.

Year	Number of CEO Successions	Number of Output Leaders	Ratio of Output Leaders
1992	104	56	0.54
1993	63	39	0.62
1994	23	10	0.43
1995	19	11	0.58
1996	19	13	0.68
1997	19	9	0.47
1998	28	13	0.46
1999	25	16	0.64
2000	33	14	0.42
2001	30	14	0.47
2002	20	12	0.60
2003*	25	5*	0.20*
2004	25	16	0.64
2005	32	18	0.56
2006	23	14	0.61
2007	25	13	0.52
2008	25	8	0.32
2009	13	6	0.46
2010	18	8	0.44
2011	0	0	NA

Chapter VII: Performance Implications of Leadership Vacillation: A Modified Treatment Effect Model Correcting for Two Selection Biases

Introduction

Chapters V and VI explored three aspects of leadership vacillation: the phenomenon's existence, antecedents, and boundary conditions. The combined results suggest that conditional on a board's capacity and motivation to change leader types, it is a non-random and common phenomenon that organizations achieve high levels of exploration and exploitation activities by sequentially switching leaders between output and throughput functions. A further question that intrigues managers and strategy researchers concerns the performance implications of leadership vacillation: What are the consequences and performance impacts for organizations that exhibit the vacillating pattern of CEO succession?

The chapter evaluates the performance implications by identifying and resolving an empirical challenge of endogeneity, in addition to the sample selection problem when analyzing the antecedents and boundary conditions. The additional challenge—self selection problem—emerges because the dependent variable— $\Delta TYPE$ —becomes the primary explanatory variable in predicting an organization's performance. Because the theory argues that a board of directors deliberately chooses a new CEO that fits the strategic mandate, the successor choice—which results in $\Delta TYPE = \text{either } 1 \text{ or } 0$ —is not randomly assigned, meaning that the board *self-selects* into either the companies with $\Delta TYPE = 1$ or those with $\Delta TYPE = 0$. Thus the empirical model must correct for the self selection problem.

The chapter adopts a modified treatment effect model to correct for the two selection problems involved in estimating performance implications. After correcting for these biases, the

empirical model yields evidence that change in leader type, $\Delta TYPE$, has a main effect—referred to as *treatment effect*—on an organization’s post-succession changes in return on assets (ROA). Equally important, the results show that when the two endogeneity problems are controlled for in separate models, the treatment effect of $\Delta TYPE$ becomes insignificant. This finding suggests that not only the two selection problems affect the estimation of the treatment effect but also they affect it in an interactive manner. The finding thus provides further support for adopting the modified treatment effect model to correct for the two endogeneity problems simultaneously.

Issues of Estimation

The empirical analysis corrects for two endogeneity problems: sample selection and self selection biases (Figure 11). Just as in the estimation of the antecedents and boundary conditions, sample selection bias arises because $\Delta TYPE$ —the key explanatory variable or the *treatment*—is observed only when there is a succession event ($\Delta CEO = 1$). Thus the dependent variable—performance changes—also is “indirectly” selected and conditional on $\Delta CEO = 1$. It is indirectly selected because I must statistically estimate and compare the counterfactuals of performance changes when $\Delta TYPE = 1$ (i.e., $y|_{\Delta TYPE=1}$) and performance changes when $\Delta TYPE = 0$ and (i.e., $y|_{\Delta TYPE=0}$), both of which are observed if and only if $\Delta CEO = 1$. Although I do observe and collect the data for $y|_{\Delta CEO=0}$, these observations do not provide any information for estimating the performance outcomes of $\Delta TYPE$, which only occurs when $\Delta CEO = 1$. So the same endogeneity issue appears as in the previous chapter (Heckman, 1974; 1979; Maddala, 1983).

In addition to sample selection, self selection bias emerges because boards do not make successor choices randomly. Specifically, because boards possess information that researchers do not know (e.g., the nature of strategic challenges they face and the “true types” of potential successors rather than a proxy of their leader types—CEO functional origins), their successor

choices would reflect situations or challenges that do not require leadership vacillation. Namely, the boards of directors choose new leaders based on their best intention and information, therefore self-selecting into the “treatment group” of $\Delta TYPE = 1$ or the “control group” of $\Delta TYPE = 0$. Consequently, to assess the main effect of $\Delta TYPE$ on a firm’s post-succession performance, researchers must account for the endogeneity problem of self selection, a common empirical issue in strategy research (Masten, 1993; 1996; Shaver, 1998; Hamilton and Nickerson, 2003; Bascle, 2008).

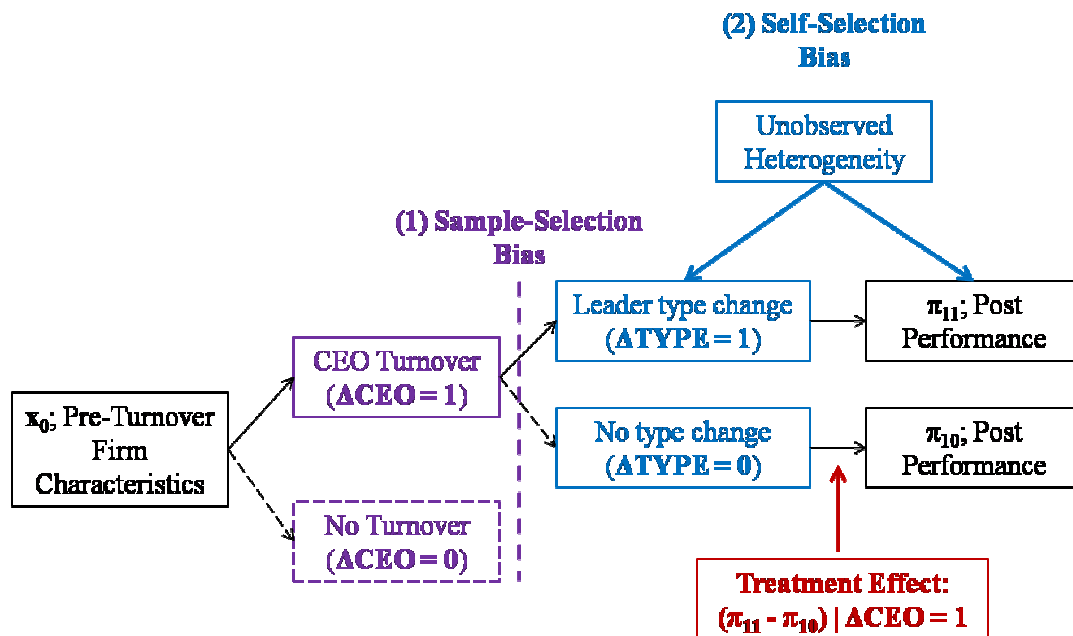


Figure 11. Endogeneity Problems of Sample Selection and Self Selection.

Sample, Data, and Measures

The sample and data sources are the same as the ones used in Chapters V and VI. Two hundred public firms are randomly selected from the 2011 list of the Fortune 500 companies, and the data of CEOs and CEO successions are collected from 1992 to 2011. Firm characteristics such as firm size and revenues that are included in the outcome equation are collected from the *Compustat* database.

Dependent Variable

Post-Succession Performance Changes (*post_Δroa*). The study employs a firm's post-succession performance changes as the dependent variable when examining the performance implications (Hypothesis 4). The dependent variable, *post_Δroa*, captures a firm's *changes* in return on assets (ROA) a year after the CEO succession. Similarly, I employ two other variables, *post2yr_Δroa* and *post3yr_Δroa*, that measure a firm's changes in ROA *two* and *three* years after the CEO succession, respectively. The reason to employ changes in ROA rather than just the ROA as the performance measure is that the theory predicts that the balance in exploration and exploitation brings *growth* of the firm, instead of static profitability. The change measure also helps control organizations' pre-existing heterogeneity in profitability levels. In addition, the three variables with time lags are used because of *time delay*—it requires time for new leaders to implement new strategies as well as for new strategies to produce performance impacts (see Figure 3). The one-year lag between the time of performance and that of CEO succession is one measure of time delay. I also adopt the two-year and three-year lags to examine whether there is a trend in the performance effects of $\Delta TYPE$. Other performance measures also are employed for robustness checks, such as changes in return on invested capital (e.g., *post_Δroic* and *post3yr_Δroic*). Table 3, at page 64, provides a summary of the variables employed.

Independent and Control Variables

Because the dependent variable is indirectly selected by CEO turnover ($\Delta CEO = 1$) when estimating the performance outcomes of $\Delta TYPE$, the independent variables that explain both ΔCEO and $\Delta TYPE$ should be included in the model. These variables are of four groups. The first set of variables is concerning the antecedents of leadership vacillation, including a departing CEO's tenure (*ceo_tenure*), a square term of the tenure (*sq_tenure*), a binary variable of remaining

as board chair (*d_chairman*), an indicator variable of exogenous succession event (*d_exogen*), a dummy variable of being an outsider CEO (*d_outsider*), and pre-succession stock performance (***pre-succession performance***). The second set of variables is about a board's capacity to change leader type, constituting the size of the board (*b_size*), average tenure of the directors (*mean_dir tenure*), the proportion of insider director (*p_insider*), and the proportion of independent director (*p_independent*). The final set contains variables measuring a board's motivation to change leader type, such as the four-firm concentration ratio (*concentration4*), relative market share of the firm (*rel_mks*), the amount of decreasing returns (*hist_roa*), and the frequency of decreasing returns (*trend_roa*). The final set of variables are control variables for the performance outcome equation. Three control variables are adopted: changes in firm size (*post_dlnat*), changes in firm revenues (*post_dlnrevt*), and changes in a firm's competitive position measured by relative market share (*post_drelmks*). The first two variables are logarithm of changes in total assets and revenues, respectively. The competitive position is measured by relative market share of the firm (*rel_mks*) (Buzzell and Wiersema, 1981; Hansen and Wernerfelt, 1989).

Method: A Modified Treatment Effect Model

Hypothesis 4 evaluates the performance implications of the partial form of leadership vacillation. Empirically, the study estimates the *treatment effect* of $\Delta TYPE$, that is, whether organizations that change the leader types of two successive CEOs perform better than those that have the same types of leaders, *ceteris paribus*. The unit of analysis is the *pair* of two consecutive CEOs in a succession event, same as in the bivariate probit model with sample selection. The standard econometric procedure is to adopt the treatment effect model, which is an extension of the Heckman selection model (Maddala, 1983: 260-267; Guo and Fraser, 2010: 85-98; Li and Prabhala, 2007; Lennox, Francis, and Wang, 2012). Before deciding which model to adopt, I

elaborate the differences between the treatment effect model and the Heckman selection model by taking the empirical settings of leadership vacillation as an example.

The differences are twofold; one relates to dependent variable and the other independent variables. First, while the Heckman selection model deals with the situation where the dependent variable is *only* observed for a subset of sample participants (e.g., $\Delta TYPE$ is observed conditional on $\Delta CEO = 1$), the treatment effect model examines the circumstances in which the dependent variable is observed for *all* sample participants, both the treated and the not treated (e.g., post-succession performance changes is observed for both $\Delta TYPE = 1$ and $\Delta TYPE = 0$). Second, in the Heckman selection model, the selection variable is *not* an independent variable in the model (e.g., no β estimate for ΔCEO in the probit equation of $\Delta TYPE$), while in the treatment effect model, the selection variable is *the* primary explanatory variable (e.g., β estimate for $\Delta TYPE$ is the key in the performance model). In addition, while the Heckman selection model controls for the sample-selection bias, the treatment effect model corrects for the unobserved heterogeneity, or the self-selection bias.

Because the theory predicts that the board of directors matches new leaders with the nature of strategic challenges, organizations would self select into either the treatment group (i.e., $\Delta TYPE = 1$) or the control group (i.e., $\Delta TYPE = 0$) based on the nature of strategic challenges they face, the nature that is heterogeneous and also unobserved by researchers. The treatment effect model is thus the standard solution for our empirical purpose. However, complexity arises again when estimating the performance effect of $\Delta TYPE$ because the dependent variable also is subject to $\Delta CEO = 1$ due to the nature of $\Delta TYPE$. Consequently, when evaluating the performance effect of $\Delta TYPE$, both the biases of sample selection and self selection are present and must be controlled for. The study thus adopts a “modified” treatment effect model that encompasses

characteristics of the treatment effect model and the Heckman selection model designed to correct for the two endogeneity problems, respectively.

The vital step in identifying the treatment effect of $\Delta TYPE$ is to develop an empirical model that incorporates the influences of the two selection criteria— ΔCEO and $\Delta TYPE$ —on the performance outcomes. To do so, I apply the Heckman's two-step procedure in the modified treatment effect model (e.g., Abowd and Farber, 1982; Catsiapis and Robinson, 1982). As a robustness check, an MLE method also is employed to examine the performance implications (e.g., Maddala, 1986; Berinsky, 2004).

The modified treatment effect model is written in three parts:

The First Selection Equation (i.e., dependent variable = CEO turnover):

$$\begin{aligned} \Delta CEO = & \eta_{1ceo_holding} + \eta_{2ceoage} + \gamma_{1ceo_tenure} + \gamma_{2sq_tenure} + \gamma_3 \mathbf{pre-succession} \\ & \mathbf{performance} + \gamma_4 d_chairman + \gamma_5 d_exogen + \gamma_6 d_outsider + \gamma_7 b_size + \gamma_8 mean_dir tenure \\ & + \gamma_9 p_indisder + \gamma_{10} p_independent + \gamma_{11} concentration4 + \gamma_{12} rel_mks + \gamma_{13} hist_roa \\ & + \gamma_{14} trend_roa + \gamma_{15} post_drelmks + \gamma_{16} post_dlnat + \gamma_{17} post_dlnrevt + \varepsilon_1 \end{aligned}$$

The Second Selection Equation (i.e., dependent variable = changes in leader type):

$$\begin{aligned} \Delta TYPE = & \beta_1 ceo_tenure + \beta_2 sq_tenure + \beta_3 \mathbf{pre-succession performance} + \beta_4 d_chairman \\ & + \beta_5 d_exogen + \beta_6 d_outsider + \beta_7 b_size + \beta_8 mean_dir tenure + \beta_9 p_indisder \\ & + \beta_{10} p_independent + \beta_{11} concentration4 + \beta_{12} rel_mks + \beta_{13} hist_roa + \beta_{14} trend_roa \\ & + \beta_{15} post_drelmks + \beta_{16} post_dlnat + \beta_{17} post_dlnrevt + \varepsilon_2 \end{aligned}$$

The Outcome Equation (i.e., dependent variable = post-succession changes in ROA):

$$\begin{aligned} post_Aroa = & \delta_0 + \delta_1 MILLS_{\Delta CEO} + \delta_2 MILLS_{\Delta TYPE} + \delta_3 \Delta TYPE + \delta_4 d_outsider + \delta_5 post_drelmks \\ & + \delta_6 post_dlnat + \delta_7 post_dlnrevt + \varepsilon_3 \end{aligned}$$

where $post_Aroa$ is the post-succession changes in ROA. The other two dependent measures, $post2yr_Aroa$ and $post3yr_Aroa$, also are used. The Heckman's two-step procedure imposes two

correction terms— $MILLS_{\Delta CEO}$ and $MILLS_{\Delta TYPE}$ —onto the performance model to correct for the sample selection and self selection biases, respectively. The value of $MILLS_{\Delta CEO}$ is the inverse Mill's ratio calculated from the first selection equation regarding to ΔCEO , and the value of $MILLS_{\Delta TYPE}$ is the inverse Mill's ratio derived from the second selection equation about $\Delta TYPE$. If δ_1 is significant, it means that sample selection bias is present in the outcome equation. Similarly, if δ_2 is significant, self selection bias is present. Moreover, the model includes an explanatory variable of $\Delta TYPE$ but does not enter ΔCEO . Note that the treatment effect is captured by the coefficient of δ_3 and is expected to be positive. Moreover, in the MLE method, the modified treatment effect model only includes one correction terms, $MILLS_{\Delta CEO}$ (Guo and Fraser, 2010). Finally, the three control variables are encompassed: changes in firm size ($post_dlnat$), changes in firm revenues ($post_dlnrevt$), and changes in a firm's relative market share ($post_drelmks$) (Buzzell and Wiersema, 1981; Hansen and Wernerfelt, 1989). Note that these control variables also are included in the two selection equations because the requirement of Heckman selection Model (e.g., Hamilton and Nickerson, 2003).

Results

Descriptive Statistics

Means, standard deviations, and correlations for variables used in the modified treatment effect model are presented in Table 14. The modified treatment effect model corrects for the two endogeneity problems by including two inverse Mill's ratios ($MILLS_{\Delta CEO}$ and $MILLS_{\Delta TYPE}$) that are derived from the two selection equations: CEO turnover (ΔCEO) and changes in leader type ($\Delta TYPE$). The results are shown in Table 15, 16, and 17, whose dependent variables are $post_\Delta roa$, $post2yr_ \Delta roa$, and $post3yr_ \Delta roa$, respectively.

Modified Treatment Effect Model Correcting for Two Endogeneity Biases

Model 1 is a traditional OLS model without correcting for any of the two selection biases. The coefficients of the two key variables, $\Delta TYPE$ and $d_outsider$, are *not* significant. Model 2, 3, and 4 include $MILLS_{\Delta CEO}$, $MILLS_{\Delta TYPE}$, and both the two ratios, respectively. Comparing the results of the first four models highlights the importance of simultaneously correcting for sample selection and self selection biases. When introducing the correction terms $MILLS_{\Delta CEO}$ and $MILLS_{\Delta TYPE}$ separately (Model 2 and 3) or none (Model 1), the treatment effect of $\Delta TYPE$ is *not* significant. However, when appropriately controlling for the two selection biases and entering both $MILLS_{\Delta CEO}$ and $MILLS_{\Delta TYPE}$ in the OLS model (Model 4), the study finds a positive performance impact for organizations that alternately change their leaders between output and throughput functions, compared to those without changes in leader type. The results are consistent with Hypothesis 4 that the performance effect of $\Delta TYPE$ is positive and significant.

Adopting the other two dependent variables with different time lags ($post2yr_Aroa$ and $post3yr_Aroa$), the study finds that organizations, on average, experienced positive growth in ROA in the first and the third years after CEO succession, while there was no significant increase in ROA at the second year. Combining the results in the three Tables, an interesting hypothesis emerges: Changes in leader type has an immediate and a lasting impact but there is an adjustment period where no significant growth in ROA in the middle of transition. The findings support the argument that it takes time for new leaders to exert their impacts on strategic and performance changes after CEO succession.

Table 14. Means, Standard Deviations, and Correlations.

		Obs.	Mean	Std.	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
(1)	<i>post_droa</i>	3691	0.001	0.072	1										
(2)	<i>delta_type</i>	371	0.593	0.492	0.008	1									
(3)	<i>MILLS_ceo</i>	2771	0.008	0.575	0.141	0.133	1								
(4)	<i>MILLS_type</i>	323	0.006	0.748	0.016	-0.917	0.008	1							
(5)	<i>post_drelmks</i>	3680	0.001	0.086	0.041	0.063	0.035	0.019	1						
(6)	<i>post_dlnat</i>	3691	0.087	0.205	-0.095	0.069	-0.169	0.006	0.204	1					
(7)	<i>post_dlnrevt</i>	3691	0.080	0.210	0.060	-0.019	-0.122	0.026	0.280	0.541	1				
(8)	<i>ceo_tenure</i>	3893	6.877	6.323	-0.073	0.088	0.443	-0.017	0.107	0.059	0.035	1			
(9)	<i>sq_tenure</i>	3893	87.257	191.874	-0.075	0.024	0.248	-0.012	0.097	0.038	0.019	0.932	1		
(10)	<i>rtn_snp500</i>	3893	0.077	0.183	0.067	0.076	-0.022	-0.017	-0.047	0.062	0.063	0.093	0.091	1	
(11)	<i>rtn_ind</i>	3882	-0.036	0.293	-0.115	-0.069	-0.042	0.023	0.090	0.051	0.146	-0.047	-0.039	-0.599	1
(12)	<i>rtn_frm</i>	3675	0.110	0.317	-0.103	0.028	-0.218	0.010	-0.019	0.172	0.144	0.131	0.065	-0.057	-0.118
(13)	<i>lag_rtn_snp500</i>	3693	0.074	0.187	-0.109	0.026	-0.051	0.007	-0.018	0.108	0.168	0.053	0.057	0.181	0.385
(14)	<i>lag_rtn_ind</i>	3682	-0.028	0.298	0.111	-0.030	-0.036	-0.010	0.071	-0.055	-0.155	0.017	0.020	-0.137	-0.288
(15)	<i>lag_rtn_frm</i>	3476	0.112	0.320	-0.189	-0.102	-0.152	0.007	-0.033	0.142	0.088	0.012	-0.011	0.044	-0.046
(16)	<i>ceoage</i>	3889	56.878	6.340	-0.098	0.063	0.224	-0.012	0.071	0.019	0.052	0.406	0.391	0.059	0.010
(17)	<i>ceo_holding</i>	3605	0.011	0.045	-0.030	-0.106	-0.101	0.072	-0.032	0.085	0.048	0.252	0.253	-0.044	0.038
(18)	<i>b_size</i>	3798	11.364	2.560	-0.071	0.106	-0.148	-0.035	0.037	0.051	0.005	0.021	0.002	0.083	0.013
(19)	<i>mean_dirtenure</i>	3799	-7.823	3.360	0.066	0.053	0.093	-0.003	0.017	-0.079	0.024	-0.390	-0.371	0.036	0.067
(20)	<i>p_insider</i>	3797	0.168	0.104	-0.001	-0.006	0.090	0.003	-0.057	0.099	0.097	0.095	0.122	0.066	-0.153
(21)	<i>p_independent</i>	3797	0.727	0.167	-0.063	0.062	-0.294	-0.057	0.053	-0.134	-0.102	-0.145	-0.161	-0.156	0.150
(22)	<i>concentration4</i>	3711	0.435	0.296	0.114	-0.041	-0.106	-0.019	-0.006	-0.112	0.012	0.026	0.060	-0.043	0.101
(23)	<i>rel_mks</i>	3881	0.615	0.364	-0.111	0.000	-0.048	0.009	-0.124	0.010	-0.063	-0.042	-0.038	0.074	-0.042
(24)	<i>hist_roa</i>	3291	0.001	0.067	-0.588	-0.006	-0.250	-0.014	0.020	0.144	0.025	0.009	0.012	0.002	0.175
(25)	<i>trend_roa</i>	3690	-0.666	0.927	-0.279	-0.039	-0.256	-0.006	-0.020	0.124	0.042	-0.045	-0.053	0.045	0.148

Table 14. Means, Standard Deviations, and Correlations (Cont.)

		(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)
(1)															
(2)															
(3)															
(4)															
(5)															
(6)															
(7)															
(8)															
(9)															
(10)															
(11)															
(12)	<i>rtn_frm</i>	1													
(13)	<i>lag_rtn_snp500</i>	0.032	1												
(14)	<i>lag_rtn_ind</i>	0.008	-0.650	1											
(15)	<i>lag_rtn_frm</i>	0.175	0.148	-0.264	1										
(16)	<i>ceoage</i>	0.042	0.124	0.005	-0.025	1									
(17)	<i>ceo_holding</i>	0.107	-0.017	0.098	0.034	0.099	1								
(18)	<i>b_size</i>	0.038	0.098	-0.016	-0.032	0.189	-0.180	1							
(19)	<i>mean_dirtenure</i>	-0.078	0.044	-0.187	0.063	-0.138	-0.285	0.067	1						
(20)	<i>p_insider</i>	0.074	0.064	0.069	0.110	-0.011	0.174	0.004	-0.137	1					
(21)	<i>p_independent</i>	-0.036	-0.127	-0.037	-0.083	-0.019	-0.267	-0.041	0.282	-0.695	1				
(22)	<i>concentration4</i>	0.016	0.050	-0.076	-0.087	0.065	-0.020	0.026	0.041	-0.082	0.076	1			
(23)	<i>rel_mks</i>	0.007	0.062	-0.103	0.046	0.018	0.045	0.088	-0.015	0.000	-0.034	0.074	1		
(24)	<i>hist_roa</i>	0.142	0.221	-0.015	0.264	0.189	0.017	0.064	-0.036	0.043	0.031	-0.052	0.058	1	
(25)	<i>trend_roa</i>	0.151	0.248	-0.073	0.268	0.005	-0.023	0.070	-0.004	0.045	-0.038	0.014	0.011	0.439	1

Table 15. Modified Treatment Effect Model [Dependent Variable: *post_Δroa*].

Performance Implication of Changes in leader type (ΔTYPE)
(standard errors in parentheses under coefficients)

Dependent variable: Post-succession change in ROA						
Independent variables	Model (1) OLS Model (no correction)	Model (2) OLS corrected for sample-selection bias (ΔCEO)	Model (3) OLS corrected for self-selection bias (ΔTYPE)	Model (4) Modified Treatment Effect Model: <i>Full</i> Model	Model (5) Treatment Effect Model (No ΔCEO)	Model (6) Modified Treatment Effect Model: <i>MLE</i> Model
<i>MILLS_{ΔCEO}</i>	—	0.002 (0.47)		0.012 ⁺ (1.65)	—	0.027** (2.87)
<i>MILLS_{ΔTYPE}</i>	—	—	0.006 (1.04)	0.022* (2.14)	—	—
<i>ΔTYPE</i>	0.015 (0.23)	0.006 (0.68)	0.008 (1.00)	0.033* (1.97)	0.018 (1.09)	0.083** (3.30)
<i>d_outsider</i>	0.010 (1.10)	0.014 (1.29)	0.007 (0.75)	0.011 (1.06)	0.002 (0.13)	0.002 (0.18)
<i>post_Δrelmks</i>	0.014 (0.45)	0.023 (0.68)	0.023 (0.71)	0.010 (0.28)	0.025 (0.93)	0.008 (0.17)
<i>post_Δlnat</i>	-0.079** (-2.63)	-0.065 ⁺ (-1.87)	-0.077** (-2.40)	-0.072* (-2.06)	-0.087* (-2.48)	-0.091* (-2.26)
<i>post_Δlnrevt</i>	0.069 ⁺ (1.77)	0.068 (1.31)	0.070 (1.59)	0.073 (1.40)	0.068 ⁺ (1.67)	0.091* (2.87)
hazard lambda	—	—	—	—	-0.266 (-1.14)	-0.963*** (-4.84)
<i>N</i>	369	369	369	369	369	369

⁺ $p < 0.1$, * $p < 0.05$, ** $p < 0.01$.

Table 16. Modified Treatment Effect Model [Dependent Variable: *post2yr_Δroa*].

Performance Implication of Changes in leader type (ΔTYPE)
(standard errors in parentheses under coefficients)

Dependent variable: Post-two-year change in ROA						
Independent variables	Model (1) OLS Model (no correction)	Model (2) OLS corrected for sample-selection bias (ΔCEO)	Model (3) OLS corrected for self-selection bias (ΔTYPE)	Model (4) OLS corrected for both ΔCEO and ΔTYPE	Model (5) Treatment Effect Model (No ΔCEO)	Model (6) Modified Treatment Effect Model: <i>Full Model</i>
<i>MILLS_{ΔCEO}</i>	—	0.003 (0.73)		0.004 (0.50)	—	0.003 (0.25)
<i>MILLS_{ΔTYPE}</i>	—	—	-0.001 (-0.21)	0.001 (0.07)	—	—
<i>ΔTYPE</i>	0.003 (0.58)	0.006 (0.90)	0.001 (0.12)	0.007 (0.49)	0.001 (0.04)	0.006 (0.18)
<i>d_outsider</i>	0.008 (1.07)	0.009 (0.85)	0.006 (0.70)	0.009 (0.88)	0.006 (0.69)	0.009 (0.95)
<i>post2yr_Δrelmks</i>	-0.024 (-0.62)	-0.058 (-1.33)	-0.056 (-1.31)	-0.058 (-1.34)	-0.056 (-1.30)	-0.058 (-1.35)
<i>post2yr_Δlnat</i>	-0.019** (-1.02)	-0.020* (0.76)	-0.015 (-0.69)	-0.019* (-0.71)	-0.015 (-0.70)	-0.019 (-0.70)
<i>post2yr_Δlnrevt</i>	0.048* (2.45)	0.061* (2.39)	0.045* (2.06)	0.060* (2.44)	0.045* (2.09)	0.060* (2.65)
hazard lambda	—	—	—	—	-0.005 (-0.70)	-0.036** (-2.91)
<i>N</i>	369	369	369	369	369	369

Table 17. Modified Treatment Effect Model [Dependent Variable: *post3yr_Δroa*].

Performance Implication of Changes in leader type (ΔTYPE)
(standard errors in parentheses under coefficients)

Dependent variable: Post-three-year change in ROA						
Independent variables	Model (1) OLS Model (no correction)	Model (2) OLS corrected for sample-selection bias (ΔCEO)	Model (3) OLS corrected for self-selection bias (ΔTYPE)	Model (4) OLS corrected for both ΔCEO and ΔTYPE	Model (5) Treatment Effect Model (No ΔCEO)	Model (6) Modified Treatment Effect Model: <i>Full Model</i>
<i>MILLS_{ΔCEO}</i>	—	-0.001 (-0.14)		-0.003 (-0.58)	—	-0.002 (-0.43)
<i>MILLS_{ΔTYPE}</i>	—	—	-0.003 (-0.49)	-0.006 (-0.79)	—	—
<i>ΔTYPE</i>	0.015 (1.84)	0.025** (2.92)	0.025** (3.22)	0.025* (2.96)	0.025** (3.27)	0.025** (3.00)
<i>d_outsider</i>	-0.011 (-1.13)	-0.017 (-1.68)	-0.016 (-1.15)	-0.024 ⁺ (-1.69)	-0.016 (-1.19)	-0.021 (-1.71)
<i>post3yr_Δrelmks</i>	-0.034 (-0.74)	-0.058 (-0.97)	-0.057 (-1.09)	-0.057 (-0.94)	-0.057 (-1.06)	-0.057 (-0.93)
<i>post3yr_Δlnat</i>	0.028 (0.35)	0.017 (0.18)	0.019 (0.22)	0.019 (0.20)	0.019 (0.22)	0.018 (0.20)
<i>post3yr_Δlnrevt</i>	-0.011 (-0.27)	0.010 (0.29)	0.006 (0.15)	0.004 (0.12)	0.006 (0.15)	0.007 (0.19)
hazard lambda	—	—	—	—	0.041 (0.51)	0.047 (0.65)
<i>N</i> *	353	353	353	353	353	353

* The number of observations decreases because of the lagged variables.

Robustness Tests

Model 5 and 6 are results of the treatment effect models using MLE rather than Heckman's correction procedure.⁴⁵ The difference between the MLE method and the Heckman's correction procedure is that the former does not include the inverse Mill's ratio, while the latter does. Model 5 is the standard treatment effect model that controls solely for the self selection bias without correcting for the sample selection (i.e., no $MILLS_{\Delta CEO}$). Like Model 4, Model 6 is the full model, but unlike Model 4 that employs the Heckman's correction procedure, Model 6 is a model that utilizes the MLE method. The inclusion of the $MILLS_{\Delta CEO}$ at Model 6 is not a part of the MLE method but is the correction for omitted variable as in the Heckman's selection model. So it should be considered as an independent variable. The results of Model 5 and 6 corroborate those of the first four models. If researchers do not correct for the sample selection bias (Model 5), the treatment effect of $\Delta TYPE$ is not significant, even if the self selection is controlled for. But after correcting for the sample selection bias (Model 6), the positive performance impact is revealed.

Table 14 shows that $\Delta TYPE$ and $MILLS_{\Delta TYPE}$ have VIFs that are greater than others but are not larger than 10 (8.47 and 8.10, respectively), which means that the standard errors for the coefficients of these two variables are approximately 2.9 (i.e., $\sqrt{8.47}$) times as large as they would be if the variables were uncorrelated with the other explanatory variables. The bottom line is that the concerns of multicollinearity are not serious because the coefficients of the two variables are statistically significant (Table 18) even though their standard errors are approximately 2.9 larger than they would be.

⁴⁵ STATA command *treatreg* adopts MLE method for estimating the treatment effect model.

Table 18. Variance Inflation Factors Scores (VIF<10).

Variable	VIF	1/VIF
<i>$\Delta TYPE$</i>	8.47 [*]	0.1181
<i>MILLS$_{\Delta TYPE}$</i>	8.10 [*]	0.1234
<i>post_dlnat</i>	1.64	0.6085
<i>post_dlnrevt</i>	1.52	0.6588
<i>MILLS$_{\Delta CEO}$</i>	1.24	0.8035
<i>post_drelmks</i>	1.13	0.8811
<i>d_outsider</i>	1.09	0.9212
Mean VIF	3.31	

Chapter VIII: Discussion and Conclusion

Discussion

By employing various empirical methods, the dissertation finds initial evidence of a statistically significant vacillating pattern in CEO succession—leadership vacillation. Moreover, several antecedent variables leading to the partial form of leadership vacillation are proposed and examined. Two sets of boundary conditions concerning a board's capacity and motivation to change leader types also are explored and empirically tested. Finally, companies that experience changes in leader type are found to enjoy greater performance increases in their post-succession ROA. In addition to these findings about leadership vacillation, an interesting observation necessitates further discussion.

The empirical results shows that (poor) pre-succession stock performance triggers CEO turnover but has no effect on changes in leader type. The six stock return variables are negatively associated with the probability of CEO turnover—as previous research has shown—but are not correlated with the likelihood of changes in leader type—a result that is not expected by the theory of leadership vacillation. The unexpected result may be due to the ambiguity of the causes of poor stock performance. While mediocre stock returns facilitate the turnover of incumbent leaders, the board of directors has to select a new leader that has the appropriate experience and credentials to improve the situation. On the one hand, the stock return may be poor because of the diminishing marginal return of an existing strategy, in which case the theory of leadership vacillation predicts a higher probability of changes in leader type ($\Delta CEO = 1$ and $\Delta TYPE = 1$). On the other hand, the poor stock performance also may be caused by a flawed implementation of a valid strategy, in which case the theory of leadership vacillation would predict changes in top leaders but no changes in leader type ($\Delta CEO = 1$ but $\Delta TYPE = 0$). Put differently, the measures of

stock performance do not reflect the underlying causes of why an incumbent leader is no longer suitable for the organization and thus is not informative to predicting the likelihood of changes in leader type. The non-significance of the pre-succession stock prices may just reflect the boards' reactions facing different underlying causes of poor pre-succession performance.

Managerial Implication

The findings of leadership vacillation also provide a managerial implication for the practice of CEO succession: The board, and the incumbent CEO, should nurture and promote successor candidates with experiences and credentials of both output and throughput functions because of the need to alternate between these two types of leader. Promoting insider successors from an existing pool of candidates is arguably less costly than hiring outsider CEOs.⁴⁶ A summary of the data also reveals that while most outsider selection ($d_outsider = 1$) leads to changes in leader type, insider promotion also results in $\Delta TYPE$.⁴⁷ The data indicates that many organizations have successor candidates with appropriate, different functional origins from their predecessor CEOs. This argument is consistent with recent research conducted by Bower (2007), who advocated an “inside outsider” approach when selecting CEO successor. An inside outsider is a leader who is promoted from within but “has somehow maintained enough detachment . . . [and] retained the objectivity of an outsider” (Bower, 2007: 8). In Bower’s study, an inside outsider is usually a successor with different functional experience from that of a predecessor CEO. While Bower (2007) did not explore a series of succession events to see whether leadership vacillation occurs, his findings are indeed in agreement with those in the dissertation.

⁴⁶ Outsider selection, compared to insider promotion, brings extra costs from various sources. For example, the outsider selection usually involves hiring an executive search firm; it violates implicit deals with potential insider successors, probably leading to their leaving the company; and it further stymies other managers whose careers likely would have been advanced with the ascendance of an insider (e.g., Cannella and Lubatkin, 1993). These costs can be saved if an insider CEO is chosen instead.

⁴⁷ Out of 100 outsider successions, 64 (or 64%) have different leader types from their predecessors'. But out of 269 insider successions, 156 (or 58%) have different leader types.

Limitations

The empirical analysis has three limitations. One is that it only examined 200 large, public companies and focused on their CEO successions after 1992. Because the sample includes companies in the Fortune 500 list, the study's generalizability to small and medium enterprises is an open question. In addition, the sample covers only the CEO successions for the past twenty years, so the succession pattern examined may be a product of modern development of corporate governance practices. Future research can collect data about small and medium-sized organizations, private companies, or entrepreneurial firms to test boundary conditions relating to different firm size. That said, the empirical results of the dissertation have value to organizations that aspire to prosper and grow in the future. After all, every company, no matter how big it is, was once a small and medium enterprise. Knowledge of leadership vacillation may provide a path to long-run survival and growth for smaller firms if boundary conditions are appropriately considered.

The second limitation is that the study did not distinguish various reasons for CEO turnover. For example, two main causes for CEO succession are planned retirement and forced dismissal. While both create an opportunity for the board of directors to fit leadership with new strategic reality, the two may have different impacts on the choice of successor. Teasing out different causes of succession events may provide further insights to research on leadership vacillation. Nevertheless, combining various types of turnover as one construct and measure is not a unique empirical treatment, nor does it invalidate the purpose of the dissertation. First, research on CEO turnover has argued that although there are many nominal reasons for CEO turnover, these causes may be due to common, latent grounds (Finkelstein, et al., 2009). For example, "dismissals, voluntary escapes, and executive fatigue" all result in CEO turnover and

may result from the departing leader's facing poor performance (Finkelstein, et al., 2009: 169). Second, because the empirical design is to treat CEO turnover as given (i.e., sample selection), the influence of employing one construct of ΔCEO on the likelihood of $\Delta TYPE$ minimizes.

The third limitation concerns the subjective measures of CEO functional origins as well as the data about the board of directors. Although following upper echelons research as closely as possible, I still made subjective judgments in three occasions, leading to either a question of construct validity or a possibility of measurement error. First, I adopt the two functional origins of output and throughput for all leaders, but the usage of the two functions may be challenged by some researchers because the original paper of Hambrick and Mason (1984) proposed three instead of two functions. The third, not adopted in the current study, is the peripheral functions, including "law and finance, which are not integrally involved with the organization's core activities" (Hambrick and Mason, 1984: 199). The notion of peripheral functions was cited from Hayes and Abernathy's (1980) concern that executives with peripheral functional backgrounds have relative deficiencies in "hands-on" experience and thus are likely to conduct unrelated diversification (Hambrick and Mason, 1984: 199).

There are two reasons I discard the peripheral function and group it into the throughput function. One is that the idea of "peripheral" such as law and finance in 1980s may not be appropriate after 1990s, my sample period. Managers and executives with finance backgrounds are hardly the ones having relative deficiencies in hands-on experience because the finance functions became crucial to the firm's core activities ever since the end of conglomeration era in early 1990s. Managers with the experience in law and finance are better described as adept at throughput functions because they become experts in increasing the efficiency and reducing waste in business opinions. The other reason is that later research papers on functional origins

also employed the two, instead of the three, functional categories, suggesting that the two categories of output and throughput may reflect a change in upper-echelon researchers' use of peripheral function in the literature (Thomas, et al., 1991; Rajagopalan and Datta, 1996; Strandholm, et al., 2004).

The other reason is that many functional backgrounds I observed when compiling the data are *not* listed in either output or throughput functions, creating the necessity of making a judgment. When facing this situation, I consulted the definitions of both output and throughput functions. For instance, strategic planning (e.g., PepsiCo current CEO Indra Nooyi's functional origin) is not included in previous work on CEO functional backgrounds. I assigned strategic planning into the output function because strategic planning has more to do with "monitoring and adjusting products and markets" than with "the efficiency of the transformation process" (Hambrick and Mason, 1984: 199). Nevertheless, despite my best efforts, these subjective choices should be guided by systematic categorization schemes that call for further research.

The final concern of measurement errors are twofold. First, Although I provided robustness checks for a leader's secondary functional background and for generalist functions, the working experiences still contain much information that I may not capture. It is possible, for example, that other than the primary and secondary functions, a leader's mindset or problem solving skills are shaped by functions that they stayed for a relatively shorter period of time. Maybe the leader met a great mentor in that position so that he or she learned the way to solve problems. In this case, the proxy of functional origin cannot reflect the true leader type of exploration and exploitation that I wanted to capture. In fact, future research may examine the relationship between a CEO's functional origin and his or her leader type, including the strategic orientation, reputation, and credentials. The proxy of functional origins is so far the closest

measure available for my purpose of research. That said, if the relationship between functional origin and a leader's type is weak, we must find another explanation for the existence of leadership vacillation, whose definition involves the functional origins of output and throughput rather exploration and exploitation. In other words, the empirical phenomenon identified by the dissertation still holds, even if the theory that explains it may not.

Future Research

Although the dissertation has found answers to questions such as the existence, antecedents, boundary conditions, and performance consequences of leadership vacillation, many questions remain open and require further study. I describe six lines of inquiry that may advance research on leadership vacillation. One line of inquiry is about the relationship between leadership vacillation and performance. On the one hand, Future research can explore organizational signals indicating the timing of necessary strategic changes because the performance signal of stock returns can only predict CEO turnover but not changes in leader type. What kinds of pre-succession performance measures, such as accounting, operational, survival, or market-based measures, are best predictors of changes in leader type? When would organizations change their CEOs and the types of successors; when would they change the CEOs but not the types of successors? On the other hand, if the board sets a mandate that demands a shift in strategic focus and then picks a CEO, does the organization with a predicted switch in leader types perform better in terms of operational and accounting measures and/or receive favorable responses from the stock market? If so, what is the performance implication of miss-matching CEO type with mandate? How can we assess it?

Second, are there different tendencies in different periods of time for observing the phenomenon of leadership vacillation? For instance, Pfeffer is quoted to report in 1981 "that

some companies have been observed to appoint CEOs, decade after decade after decade, from the same functional area” (Finkelstein, et al., 2009: 194). But the sample in the current study shows that, at least in the decades from 1992 to 2011, leadership vacillation is more common than patterns with the same functions (e.g., O-O-O and T-T-T). What kinds of changes, institutional or/and organizational, were underlying the emergence of the phenomenon of leadership vacillation? Furthermore, how would we identify those industries where only exploitation is needed or where exploitation periods are longer than the 20 year window currently used? Future research should add industry effects to the analysis.

Third, future research can explore alternative as well as additional boundary conditions to determine when the phenomenon is likely to occur. For the former, an alternative boundary condition can be developed by relaxing the assumption (A3) concerning high adjustment costs for leaders to change the nature of strategies. For instance, if some organizations can recruit, promote, or nurture leaders who are adept at both strategies, it is less likely for those organizations to exhibit leadership vacillation because incumbent leaders are capable of switching between the two strategies. What industries might have lower CEO adjustment costs so that leaders are easier to be generalists instead of just output or throughput experts? Moreover, recent research in neuroscience may help us understand a micro-foundation of CEO adjustment costs, in addition to research on expert performance. For the latter, the theory argues that organizations are likely to display leadership vacillation when they desire to achieve high levels of long-run performance, which demands high levels of *both* exploration and exploitation. The resulting question is *in what kinds of organizations* leadership vacillation is likely—or not likely—to occur. Are private companies that aim to be acquired, instead of long-run survival, more or less likely to display leadership vacillation? How about companies that aim to serve only

a niche market, instead of long-run growth—expansion and diversification into other product and geographic markets? Do industry conditions other than competitive intensity affect whether or not an organization demands high levels of both exploration and exploitation activities, which alter the likelihood of observing leadership vacillation?

Fourth, future research also can study the relationship between leadership vacillation and structural vacillation. While both structural vacillation and leadership vacillation are means to dynamically balance exploration and exploitation, does leadership vacillation lead to structural vacillation or vice versa? Is there a monotonic correspondence between leadership vacillation and structural vacillation, or is one vacillation incorporates multiple vacillations of the other? What are the consequences when a leader who is an expert in exploration strategy must restructure a decentralized organization into a centralized one that facilitates exploitation activities?

A fifth line of inquiry relates to a firm's best response of CEO types compared to its rivals' moves. In my dissertation, only endogenous factors are considered as drivers of leadership vacillation. However, exogenous factors such as competitors' strategic behavior also may have impacts on the best responses of a focal firm's strategic behavior, which can affect the choice of CEO successor. Does leadership vacillation a function of rivals' CEO types? If so, does an output-oriented rival lead to an output or a throughput successor of the focal firm?

Finally, how do top management teams complement CEOs and how does this complementarity affect the likelihood of leadership vacillation? Does a top management team that has senior executives with strong complementary skills and experiences to the incumbent CEO enable the firm to make necessary strategic changes without selecting a new leader? If so, are there conflicts in design elements that create negative externality in implementing a firm's strategy? Do organizations that change their successive leaders with different types outperform

those that recruit top management teams to balance exploration and exploitation? Knowledge of the abovementioned five questions will provide a stronger foundation for research on leadership vacillation in specific and for the approach of organizational vacillation in general.

Conclusion

The dissertation adopts—and contributes to—an emerging approach of organizational vacillation, which argues that organizational choices may exhibit a pattern of vacillation because some organizations attempt to dynamically achieve high levels of both exploration and exploitation activities to generate long-run performance (Nickerson and Zenger, 2002; Lavie and Rosenkopf, 2006; Gulati and Puranam, 2009). Contrary to a dominant paradigm in strategy research emphasizing contingent fit between the environment and organizational choice, the emerging organizational vacillation approach highlights endogenous components, instead of the external environment, that shape organizational decisions. The study finds some evidence that successor choice also is, at least partially, endogenously determined and, in many instances, exhibits a vacillating pattern, as suggested by organizational vacillation.

Adopting the conviction that “organizational research is better informed by moving away from snap shots of organizational strategies and instead exploring dynamics and histories” (Boumgarden, et al., 2012: 607), the dissertation empirically defines, identifies, and examines a common and non-random pattern of CEO succession—leadership vacillation. In doing so, the study solves a conundrum of how organizations select leaders to balance exploration and exploitation given the fit between leadership and strategy. The study solves the conundrum by applying insights of organizational vacillation to successor choices, therefore supporting and illustrating the importance of exploring dynamics and histories in strategy and organization research.

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Appendix

Appendix 1: STATA codes for the bivariate probit model with sample selection

```
*****  
**                               **;  
*****
```

eststo: quietly

```
heckprob delta_type ceo_tenure sq_tenure d_chairman d_exogen d_outsider  
  
    rtn_snp500 rtn_ind rtn_frm lag_rtn_snp500 lag_rtn_ind lag_rtn_frm,  
  
select (delta_ceo = ceoage ceo_holding  
  
    ceo_tenure sq_tenure d_chairman d_exogen d_outsider  
  
    rtn_snp500 rtn_ind rtn_frm lag_rtn_snp500 lag_rtn_ind lag_rtn_frm ,  
  
    noconstant) noconstant vce(cl gvkey) ;
```

```
*****  
**                               **;  
*****
```

eststo: quietly

```
heckprob delta_type ceo_tenure sq_tenure d_chairman d_exogen d_outsider  
  
    rtn_snp500 rtn_ind rtn_frm lag_rtn_snp500 lag_rtn_ind lag_rtn_frm  
  
    b_size mean_dirtenure p_insider p_independent ,  
  
select (delta_ceo = ceoage ceo_holding  
  
    ceo_tenure sq_tenure d_chairman d_exogen d_outsider  
  
    rtn_snp500 rtn_ind rtn_frm lag_rtn_snp500 lag_rtn_ind lag_rtn_frm  
  
    b_size mean_dirtenure p_insider p_independent ,  
  
    noconstant) noconstant vce(cl gvkey) ;
```

```

*****
**      Model 3: antecedent variables + a borad's motivation      **
*****

```

eststo: quietly

```

heckprob delta_type ceo_tenure sq_tenure d_chairman d_exogen d_outsider

    rtn_snp500 rtn_ind rtn_frm lag_rtn_snp500 lag_rtn_ind lag_rtn_frm

    concentration4 rel_mks hist_roa trend_roa ,

select (delta_ceo = ceoage ceo_holding

    ceo_tenure sq_tenure d_chairman d_exogen d_outsider

    rtn_snp500 rtn_ind rtn_frm lag_rtn_snp500 lag_rtn_ind lag_rtn_frm

    concentration4 rel_mks hist_roa trend_roa ,

    noconstant) noconstant vce(cl gvkey) ;

```

```

*****
**      Model 4: Full model: antecedents and boundary conditions      **
*****

```

eststo: quietly

```

heckprob delta_type ceo_tenure sq_tenure d_chairman d_exogen d_outsider

    rtn_snp500 rtn_ind rtn_frm lag_rtn_snp500 lag_rtn_ind lag_rtn_frm

    b_size mean_dirtenure p_insider p_independent

    concentration4 rel_mks hist_roa trend_roa ,

select (delta_ceo = ceoage ceo_holding

    ceo_tenure sq_tenure d_chairman d_exogen d_outsider

    rtn_snp500 rtn_ind rtn_frm lag_rtn_snp500 lag_rtn_ind lag_rtn_frm

    b_size mean_dirtenure p_insider p_independent

    concentration4 rel_mks hist_roa trend_roa ,

    noconstant) noconstant vce(cl gvkey) ;

```

```

*****
**          Model 5: Outcome equation: delta_type          **
*****

```

eststo: quietly

```

probit delta_type ceo_tenure sq_tenure d_chairman d_exogen d_outsider

    rtn_snp500 rtn_ind rtn_frm lag_rtn_snp500 lag_rtn_ind lag_rtn_frm

    b_size mean_dirtenure p_insider p_independent

    concentration4 rel_mks hist_roa trend_roa ,

    noconstant vce(cl gvkey) ;

```

```

*****
**          Model 6: Selection equation: delta_ceo          *
*****

```

eststo: quietly

```

probit delta_ceo ceoage ceo_holding

    ceo_tenure sq_tenure d_chairman d_exogen d_outsider

    rtn_snp500 rtn_ind rtn_frm lag_rtn_snp500 lag_rtn_ind lag_rtn_frm

    b_size mean_dirtenure p_insider p_independent

    concentration4 rel_mks hist_roa trend_roa ,

    noconstant vce(cl gvkey) ;

```

```

*****

```

Appendix 2: STATA codes for the modified treatment effect model

```
*****  
**                               **;  
**      Stage 1: CEO turnover      **;  
**      Predicting delta_CEO      **;  
*****  
  
probit delta_ceo ceoage ceo_holding  
  
      ceo_tenure sq_tenure  
  
      rtn_snp500 rtn_ind rtn_frm lag_rtn_snp500 lag_rtn_ind lag_rtn_frm  
  
      b_size mean_dirtenure p_insider p_independent  
  
      concentration4 rel_mks hist_roa trend_roa  
  
      post_drelmks post_dlnat post_dlnrevt ,  
  
      noconstant vce(cl gykey) ;  
  
  
*****  
**                               **;  
**      generate MILLS_ceo from the probit model      **;  
*****  
  
predict lp,xb;  
  
gen MILLS_ceo =-normalden(lp)/(normprob(lp)) if delta_ceo ==1 ;  
  
replace MILLS_ceo = normalden(lp)/(1-normprob(lp)) if delta_ceo ==0 ;  
  
sum MILLS_ceo ;
```

```

*****
**                               Stage 2: changes in leader type          **
**                               Predicting delta_TYPE                    **
**                               note that the sample observations are 369  **
*****

```

```

probit delta_type ceo_tenure sq_tenure d_chairman d_exogen d_outsider
      rtn_snp500 rtn_ind rtn_frm lag_rtn_snp500 lag_rtn_ind lag_rtn_frm
      b_size mean_dirtenure p_insider p_independent
      concentration4 rel_mks hist_roa trend_roa
      post_drelmks post_dlnat post_dlnrevt ,
      noconstant vce(cl gvkey) ;

```

```

*****
**                               generate MILLS_type from the probit      **
*****
predict lp2,xb;

gen MILLS_type = -normalden(lp2)/(normprob(lp2)) if delta_type ==1 ;

replace MILLS_type = normalden(lp2)/(1-normprob(lp2)) if delta_type ==0 ;

sum MILLS_type ;

```

```

*****
**                               Stage 3: Performance Implications          **
** Predicting how much impact delta_TYPE has on a firm's                  **
** post-succession performance changes                                    **
** note that the observations are 369.                                    **
*****

```

```

reg post_droa MILLS_ceo MILLS_type delta_type d_outsider

post_drelmks post_dlnat post_dlnrevt ;

```

```

*****
*****
** Alternative Model: Modified Treatment Effect Model                      **
** Treatment Effect Model plus MILLS_ceo                                  **
** outcome equation: post-succession performance                          **
** selection equation: changes in leader type                             **
** Step 2 & 3: Estimating the treatment effect of                         **
** changes in leader type, which include both                             **
** the outcome equation and the selection equation                        **
*****

```

```

treatreg post_droa MILLS_ceo d_outsider

post_drelmks post_dlnat post_dlnrevt ,

treat (delta_type = ceo_tenure sq_tenure d_chairman d_exogen d_outsider

rtn_snp500 rtn_ind rtn_frm lag_rtn_snp500 lag_rtn_ind lag_rtn_frm

b_size mean_dirtenure p_insider p_independent

concentration4 rel_mks hist_roa trend_roa

post_drelmks post_dlnat post_dlnrevt, noconstant)

noconstant vce(cl gvkey) ;

```

```

*****
**                               Model 1: OLS with no correction **
*****

```

eststo: quietly

reg post_droa delta_type d_outsider

post_drelmks post_dlnat post_dlnrevt, nocons robust ;

```

*****
**                               Model 2: OLS with MILLS_ceo **
*****

```

eststo: quietly

reg post_droa MILLS_ceo delta_type d_outsider

post_drelmks post_dlnat post_dlnrevt, nocons robust ;

```

*****
**                               Model 3: OLS with MILLS_type **
*****

```

eststo: quietly

reg post_droa MILLS_type delta_type d_outsider

post_drelmks post_dlnat post_dlnrevt, nocons robust ;

```

*****
** Model 4: Full Model OLS with MILLS_ceo and MILLS_type **
*****

```

eststo: quietly

reg post_droa MILLS_ceo MILLS_type delta_type d_outsider

post_drelmks post_dlnat post_dlnrevt, nocons robust ;


```

*****
**      Model 5: Treatment effect Model without MILLS_ceo      **
*****

```

eststo: quietly

treatreg post_droa d_outsider

post_drelmks post_dlnat post_dlnrevt ,

treat (delta_type = ceo_tenure sq_tenure d_chairman d_exogen d_outsider

rtn_snp500 rtn_ind rtn_frm lag_rtn_snp500 lag_rtn_ind lag_rtn_frm

b_size mean_dirtenure p_insider p_independent

concentration4 rel_mks hist_roa trend_roa

post_drelmks post_dlnat post_dlnrevt, noconstant)

noconstant vce(cl gvkey) ;

```

*****
**      Model 6: Treatment effect Model with MILLS_ceo      **
*****

```

eststo: quietly

treatreg post_droa MILLS_ceo d_outsider

post_drelmks post_dlnat post_dlnrevt ,

treat (delta_type = ceo_tenure sq_tenure d_chairman d_exogen d_outsider

rtn_snp500 rtn_ind rtn_frm lag_rtn_snp500 lag_rtn_ind lag_rtn_frm

b_size mean_dirtenure p_insider p_independent

concentration4 rel_mks hist_roa trend_roa

post_drelmks post_dlnat post_dlnrevt, noconstant)

noconstant vce(cl gvkey) ;

```

*****

```